INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

October 27, 1992

Reree – YNSW3 –
See p 2

Thomas Moldauer
Andersen Consulting
69 W. Washington
Chicago, IL

Dear Tom:

This letter lays out the approach INPUT proposes in order to assess customer preferences and needs for C++ versus Smalltalk.

Scope/Methodology

As we discussed on the telephone, I have drafted a questionnaire to illustrate the scope of the study. The questionnaire was molded by the following logic:

- The importance of offering particular object-oriented facilities is directly proportional to the importance that customers place on being able to modify a package. That is, if a customer is happy to accept the functions contained in a standard package, then their views on Smalltalk probably are not very important.
- The importance of languages needs to be placed in context with other object-oriented and technical issues affecting modifications.
- Similarly, the votes of those most likely to install applications and use software packages should also receive more weight.

Language Evaluation

Question 4 in the questionnaire will pay special attention to the language choice issue, extracting comments, whatever the rating given. If the respondent has no particular opinion or knowledge on the issues in Question 4, we will get a referral to someone more knowledgeable. Having to do this will be a negative:

- We will be generally qualifying respondents inside the IS organization based on their knowledge of the applications selection process. If this person is informed generally, but not on language issues, this in itself is probably good evidence that object-oriented issues are not very important to the organization.
- The referral person may be a techie who is not well-connected with the overall selection process. We will pay special attention to these kinds of cases during the interview process.

Additional Information Needed From You

Please note that in question 1 we intend to insert a list of applications/modules for respondents to focus on. I want to use the ones that are most important to you. Please let me know which to insert.

We will interview 80 companies in the manufacturing sector (half large and half medium). Are there particular niches that we should include/exclude? Otherwise, we will stratify the sample to get a proportionate mix of subsectors of manufacturing.

Schedule

I can have some raw results for you 2-3 weeks after interviewing starts (depending on when I can fit this into the interviewing stream). These results would not include the weighting by those most likely to buy, who value modifications, etc. However, it should be helpful in your planning. The full analysis and report would be ready before Christmas.

Renee

As we discussed, this study, when completed, will exhaust the $40,000 originally set aside for market research in August.

I will be traveling on Friday and at the INPUT conference on Monday and Tuesday in California. I will be in (or around) INPUT's California office on Wednesday, Thursday and, possibly, Friday. However, I can be in communication with you with no more than a half day lag.

Sincerely,

Thomas O'Flaherty
Vice President

a:cust4:YNSW3P

PROJECT SCHEDULE

Week

Activity	Name	Act. Days	Factor	ESD	11/6 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Questionnaire	TA^2			½	½													
80 Int + Tab	X			6		1	2	2	1									
An	JP/TA^2			2					1	1								
Rpt	TA^2			2						1	1							
Pres	TA^2			1							1							
TY	JP			½								½						
TOTAL PLAN SR.	▨		▨	▨														
TOTAL PLAN RA	▨		▨	▨														
TOTAL PLAN ESDs	▨	▨	▨	12														

Proj. Code: YNSW3 Proj. Name: Object Oriented Prepared by: TA

Proj. Manager: TA^2 Date: 11/6 rev Page 1 of

PROJECT WORK STATEMENT

TITLE Object-Oriented Need

CLIENT Andersen Consulting

CONTRACT: ATTACHED ____ TO FOLLOW ____ LETTER ✓ VERBAL ____

PROJECT LEADER TRF PROJECT CODE YNSK03

DATE STARTED 11/2/92 PLANNED COMPLETION DATE 1/1/93

LEVEL OF EFFORT(Professional Man Days) ____

TOTAL CONTRACT VALUE: $ or £ 19,000

REVENUE DISTRIBUTION (% or $) INPUT US 100 INPUT LTD ____

REIMBURSABLE EXPENSES: NO ____

YES ✓

EXP. BUDGET 1000 TO COVER:

TRAV: ✓
TELE: ✓
RPT. PREP.: ✓
OTHER: ____

BILLING SCHEDULE DESCRIPTION All paid in advance

PROJECT DESCRIPTION To see object-oriented need in mfg

INDICATE TYPE OF WORK: REPORT ✓ PRESENTATION ____

THANK YOU PACKAGE: YES ✓ NO ✓

ACCOUNTING USE ONLY: ENTERED ON CURRENT PROJECT LIST ____

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LIBRARY FILE
NEW JERSEY
INPUT LTD.

Originator

SHEILA (Y&Z on
BINDER COPY

Date Typed

PROJECT WORK STATEMENT Paid in Advance

TITLE Mission-Critical Applications

CLIENT Andersen

CONTRACT: ATTACHED____ TO FOLLOW____ LETTER / VERBAL____

PROJECT LEADER TCP PROJECT CODE YNSW2

DATE STARTED Oct 1 92 PLANNED COMPLETION DATE Nov 20

LEVEL OF EFFORT(Professional Man Days) 12

TOTAL CONTRACT VALUE: $ or £ $19,000

REVENUE DISTRIBUTION (% or $) INPUT US 100 INPUT LTD____

REIMBURSABLE EXPENSES: NO____

YES x

EXP. BUDGET 1,000 TO COVER: TRAV: x

TELE: x

RPT. PREP.: x

OTHER:____

BILLING SCHEDULE DESCRIPTION All paid in advance

PROJECT DESCRIPTION Interview Mfg Cos to see appl needs

INDICATE TYPE OF WORK: REPORT x PRESENTATION____

THANK YOU PACKAGE: YES x NO____

ACCOUNTING USE ONLY: ENTERED ON CURRENT PROJECT LIST____

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INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: 11|6

Confidential: Y / N

Urgent: [✓ Y] / N

To: Name: Renee

Tel./Location:

Co.:

Page: 1 of 6

Fax No:

File: Chron
Contact
Other:

From: TAR

Subject: YNSW2 / 3

As you recall, this was paid in advance, with work to be defined. Situation

YNSW2 - PWS attached
- I think there are only 2 more ESDs left to be done - week of 11/13
- Assume you don't need schedule for them

YNSW3 · PWS attached
Sched attached
Letter confirming work attached

PROJECT WORK STATEMENT

TITLE Software Product Due Diligence

CLIENT Andersen Consulting
invoice submitted

CONTRACT: ATTACHED ____ TO FOLLOW ____ LETTER ____ VERBAL X

PROJECT LEADER ____ PROJECT CODE ____

DATE STARTED Aug 15 92 PLANNED COMPLETION DATE Nov 15

LEVEL OF EFFORT(Professional Man Days) 24

TOTAL CONTRACT VALUE: $ or £ 38,000

REVENUE DISTRIBUTION (% or $) INPUT US 100 INPUT LTD ____

REIMBURSABLE EXPENSES: NO ____

YES X

EXP. BUDGET $42,000

TO COVER: TRAV: /
TELE: /
RPT. PREP.: /
OTHER: ____

BILLING SCHEDULE DESCRIPTION All paid in advance

PROJECT DESCRIPTION Still being defined: (1) Develop approach (2) Review 4-5 products

NO SCHEDULE YET

INDICATE TYPE OF WORK: REPORT ____ PRESENTATION X

THANK YOU PACKAGE: YES X ? NO ____

ACCOUNTING USE ONLY: ENTERED ON CURRENT PROJECT LIST ____

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BINDER COPY

Date Typed

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: 9/29
To: Name: Tom Moldauer
Tel./Location:
Co.:
Fax No: 312-507-0510
From: Tom O'Flaherty
Subject:

Confidential: Y / N
Urgent: Y / N

Page: 1 of 6

File: Chron
Contact
Other:

ADM 341/05 1/92

tember 28

To: Tom Moldauer, Andersen

Fm: Tom O'Flaherty

Via fax: 312-507-0510

Sub: Outline of Due Diligence Findings

Attached is a draft outline of the end product from INPUT's research for the due diligence effort.

Points 1 to 4 would come out of the customer research Asterisks show what probably couldn't be carried forward from the "food processor" interviews: The major changes to the interviewing will be to try to focus on specific applications groups and to find out the probability of new applications as well as using software packages.

Point 5 would come from interviews with selected vendors. We should decide on who these vendors should be about half way through the customer interviews; knowing the general results from the customer interviews will help us focus on specific competitive areas.

Point 6 would be largely summary.

As far as I can see, this would meet or exceed your original outline ("Market Research Requirements, August), with the same minor reservations as were in my memo of August 28. I have used the outline below because the results seem to flow better from the research; there would be no problem in putting it into a different order.

A copy of my 8/28 "Research Approach to 'Due Diligence'" is attached for your information.

DRAFT

OUTLINE OF MAJOR OUTPUTS FOR DUE DILIGENCE

1. Market Size (by application*)

o Applications to be installed (all sources; new or replacements)

o Percent packages

o General levels of dollar investment for application

o Market size (from above)

2. Segmentation Factors

o By size

o By buying intention* (e.g., definite vs. likely vs no intention)

o By buyer values (see # 3 below)

o By level of investment

o Other (as emerges from data)

3. Buyer Values

o Feature/function values*

o Importance of technology/specific technology

o Importance of specific applications*

4. Decision Makers

o User role generally

o Variables by company size, industry and/or application* (or other)

5. Competitive Assessment

o Competitors' assessment of market (vs. above)

General direction/plans

Strengths and weaknesses

6. Key Factors of Success (Summary of Above Findings)

- Applications
- Segments
- Features
- Technology
- Marketing

RESEARCH APPROACH TO "DUE DILIGENCE"

The general approach will be to utilize interview research from prospective customer groups. The topics covered will be somewhat similar to those used for Yardstick, but with the detailed focus on the specific applications areas being investigated (as opposed to having the respondents choose applications areas).

The questions will be cover the following:

- Issues/problems generally (to understand values, reasons for changing)
- Reasons for considering/not considering the use of packages; things that could make them change their plans
- Timing/size of new applications (for market sizing, growth)
- Feature/criteria lists; who decides
- Vendor issues: what they look for generally; specifics on individual vendors (where available)

50 companies or divisions should be interviewed, split between larger companies and smaller companies; we will want to understand how large, multi-division companies operate from both a systems standpoint and a management responsibility standpoint (e.g., how important is uniformity).

We will also want to explore the issue of tie-ins to other applications.

We will also selectively talk to other, especially potential, vendors. Planned activities are the most important, so the "interviews" will be less structured and often indirect (e.g., talking to third parties who have knowledge of vendor activities).

In addition to the above targeted research, we will also get information and assessments from other INPUT staff and we will take into account publicly-reported information.

I think that this approach will give us virtually all the information described in the "Market Research Requirements" draft you shared with INPUT. There are a few exceptions (that I do not think will leave significant voids):

- This information will be for the U.S. only; in a few places in the "Requirements" worldwide information is called for.

  I believe that our previous assumption should hold true: First see if there is a U.S. market, then look at other geographic markets
- List of Target Companies: Commercial lists can be obtained from sources such as Computer Intelligence or D&B. We should be able to supply at least a partial list from lists we use for interviewing

- "Key buyer values" do not necessarily depend on interviewing the key decision makers themselves. Often someone who is part of the process can provide perfectly adequate information on how the process operates quite efficiently.

  For example, We recently performed a study where the client insisted that we talk face-to-face with senior user executives; in most cases this turned out to be overkill; preparatory telephone interviews with others in the organization yielded very similar information (in one-half the time and at one-quarter the cost).

MEMORANDUM

DATE: August 28, 1992

TO: Tom Moldauer, Andersen

Fax: 312-507-2548

FROM: Tom O'Flaherty, INPUT

Hope you had a good vacation and are back into the swing of things.

Attached are two due diligence-related items we had discussed before you left on vacation.

- A research approach for the "due diligence" work
- Some ideas on process manufacturing vertical selection

PROCESS MANUFACTURING VERTICAL SELECTION

As I'm sure you're aware, one of the hardest things to identify is the number of potential customers for a software product, especially application software. Two variables are

- The number of different units within a firm that can use a copy of a product. This is an important issue for client/server-type products.
- Whether purchasing decisions are centralized or decentralized -- more firms are decentralizing than centralizing now.

Both variables argue for looking at "establishments", rather than "enterprises", to get baseline counts of opportunities.

Exhibit 1 shows the establishment count for three process segments.

- The $100 million cutoff is somewhere in the middle of the 250-499 group. Chemical companies do about $250k per employee in sales and the other two under $200k.
- Food has over twice as many potential customer sites as chemicals and almost an order of magnitude more than drugs.
- Drugs and chemicals share many systems features from a production standpoint; however, drugs is closer to food from a downstream, or marketing, standpoint.

Drugs and chemicals are probably more decentralized than food, reducing the number of sales points.

I would go for food

- It has the larger number of potential customers.
- We already have some recent insights into the sector from the "yardstick" research.

"Food" could be larger still if combined with "consumer products". My problem is that "consumer products" covers a very large range from a manufacturing standpoint.

Exhibit 2 takes five of the largest consumer product companies and breaks apart their product lines (and also provides a rough idea of size/importance). I draw several conclusions from this data:

- It would be difficult initially to develop targeted applications to cover many of their manufacturing systems needs.
- It would be more feasible to develop marketing-oriented products that are more horizontal in nature.

- There is also a problem in how to count, or even find, these kinds of companies:
    - SICs don't work, since there are a preponderance of industrial companies in most of the SICs in Exhibit 2.
    - Lists of "consumer product" companies tend to be short or contradictory. For me, it's almost "I know one when I see one", but that's an awkward method of arriving at a market population.

Maybe we should just consider the consumer products segment as a bonus opportunity that enhances the value of the food segment.

3

RESEARCH APPROACH TO "DUE DILIGENCE"

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Ex 1

NUMBER OF ESTABLISHMENTS BY SIZE:

SELECTED PROCESS MANUFACTURING SEGMENTS

PROCESS MANUFACTURING SEGMENT	250-499 EMPLOYEES	500-999 EMPLOYEES	1,000+ EMPLOYEES	SUBTOTAL 250+ EMPLOYEES	SUBTOTAL 500+ EMPLOYEES
FOOD	912	376	124	1,412	500
DRUG	76	42	36	154	78
CHEMICAL (EXCLUDING DRUG, INCLUDING PETROLEUM REFINING)	341	165	103	609	268

YNSW2

Ex 2

DISTRIBUTION OF PRODUCT GROUPS IN FIVE LEADING CONSUMER PRODUCT COMPANIES

MAJOR SIC:	FOOD		PAPER	CHEMICALS				GLASS	FABRIC. METAL	ELECTRONIC ELECTRICAL	MISC. MANUFACTURING			RETAIL
3-DIGIT SIC:	DOG FOOD (204)	OILS (207)	SANITARY NAPKINS (267)	DRUGS (283)	SOAP & COSMETICS (284)	INDUST. CHEM. (286)	MISC. CHEM. (289)	GLASS (322)	CUTLERY (342)	APPLICANCES (363)	PENS (395)	COSTUME JEWELRY (396)	BRUSHES (399)	CATALOG (596)
COMPANY														
PROCTOR AND GAMBLE		5	2	3	1									
GILLETTE					2		5		1	3	4		6	
COLGATE	3				1			4					2	
INTERNATIONAL FLAVORS						1								
AVON					1			2				3		4

YNSW2 Source: SICs repprted to D&B in order of importance
(4 digit SICs summarized into 3 digit SICs)

ORDER/INVOICE/FULFILLMENT

Acctg. ONLY

Inv. Comp.	By:	Date:	Client #	Order #	Inv. #	Multi-Invoicing ___ of ___

CUSTOMER/INVOICE TO

ORIGINATOR (Signaure) ____ DATE 8/14/92

Company Andersen Consulting
Name Mr./Ms. Thomas Moldovan
Position ____
Address 69 W Washington St
____
City Chicago
Province ____
Phone 312-507-8743

CA Tax Rate ____
CT Tax 8% ____
Salutation ____
State IL
Zip 60602
Country ____
Fax 312 507-2548
Tlx ____

APPROVALS
VP Sales/Res.
Date
Controller
Date

Special instructions for invoicing, progress billing, or delayed payments, etc.
Invoice immediately for fiscal yr reason

ORDER

Contract Year Beg. ____
End ____

☐ New Order (N1) ☐ Prior Yr (N3)
☐ Renewal (N2) ☐ Cancel

Invoice Type
☐ Fulfillment Only
☐ W/Order (OR)
☐ Monthly (MO)
☐ Quarterly (QT)
☐ Pending

Employee # Sold by:
TP 100%
____ ___%
____ ___%

Employee # Commission to:
____ ___%
____ ___%
____ ___%

CLIENT AUTH.

INPUT Contract ☐ Letter ☐ Verbal ☒

PO# ____
Attach all authorizing documents to white (contract) copy.

SHIP TO

Company ____
Name Mr./Ms. ____
Position Same
Address ____
____
City ____

Province ____
Salutation ____
State ____
Zip ____
Country ____
Phone ____

ITEM TYPE

- Subscription (SB)
- Custom (YC/ZC/KC)VC
- Multiclient (MC)
- Reports (RP)
- Copies (CP)
- Consult/Present (PR)
- Newsletter (NL)
- Reimbursed Costs (EX)
- Merger/Acq. (ME)
- Exec Overview (EO)
- Conf/Seminar (CN)

DETAIL

Indicate US, UK, FR, VA	Prod. ID/Year	Item Type Code	Item Description or Title	Quantity	Price	Shipped By	Date
US	YNSW2		To be defined		15,000		
	YNSW3		"		25,000		
			(includes expenses)		40,000		

Fulfillment to be completed in: ☐ Corporate ☐ London ☐ Virginia ☐ France ☐ Other ____

• White - Contract • Green - Fulfillment • Yellow - Invoice • Pink - Originator • Goldenrod - Sales Manager

M&S180 11/90

INPUT

Entity - 7/90
(Doc. #0431c)

CONSULTANT AGREEMENT

THIS AGREEMENT is made and entered into as of this 18 day of January, 1993, by and between [Andersen Consulting or Arthur Andersen & Co.] ("Andersen"), and INPUT ("Consultant").

WHEREAS, Consultant is in the business of providing consultation and technical support services specializing in Marketing Research;

WHEREAS, Andersen desires to retain the services and expertise of Consultant relating to the above mentioned and other areas of expertise;

NOW, THEREFORE, in consideration of the premises and mutual agreements herein, Andersen and Consultant agree as follows:

1. Consultant's Services.

(a) Andersen hereby retains Consultant and Consultant agrees to be so retained on the terms and conditions set forth in this Agreement to assist Andersen in connection with one or more Andersen internal projects and/or client engagements. Consultant's services shall consist generally of [DESCRIBE SERVICES. - e.g. technical consultation and support to Andersen and its clients in the areas of analysis, design, database design, software installation, implementation and education in connection with development of integrated software systems, etc.] (the "Services").

(b) Consultant shall perform the Services hereunder pursuant to such assignments as Andersen may issue from time to time. In performing the Services, Consultant shall maintain liaison with and report to Scott Morrison, Teresa Possmodel, Janice Krieger or such other Andersen partner or manager as Andersen may designate.

(c) Consultant shall make the following individuals available to Andersen to perform the Services specified herein:

Tom O'Flaherty
Joanne Pomwitz
other support staff

There shall be no substitution for the person(s) named above without Andersen's prior written consent.

2. Independent Contractor Status.

In connection with this Agreement, Consultant shall be an independent contractor and as such will not have any authority to bind or commit Andersen. Nothing herein shall be deemed or construed to creat a joint venture, partnership, agency or employee/employer relationship between the parties for any purpose, including but not limited to, withholding for purposes of Social Security or income tax, or entitlement to vacation, insurance, retirement or other employee benefits. Consultant will be solely reponsible for payment of any and all taxes and insurance, including workers' compensation hereunder. Consultant will submit evidence of compliance with the provisions of this paragraph in a form and manner satisfactory to Andersen.

3. Power to Act on Behalf of Andersen.

Consultant shall not have any right, power or authority to create any obligation, express or implied, or make any representation on behalf of Andersen except as it may be expressly authorized from time to time by Andersen and then only to the extent of such authorization.

4. Fees.

fees as outlined in proposal

Andersen shall pay to Consultant ~~[DESCRIBE FEES - e.g. a fee of $60.00 per hour~~] for the Services rendered under this Agreement. Consultant shall not be entitled to any other compensation for such Services. It is expressly understood that Consultant shall have no interest in or claim to any billings by Andersen to its clients for professional services that may be generated in connection with the Services hereunder. Consultant will submit invoices ~~monthly.~~ Payment on satisfactory invoices shall be made within thirty (30) days of receipt and approval by Andersen.

on a regular basis as appropriate based on expenses incurred.

5. Expenses.

(a) Andersen shall reimburse Consultant for all actual, allowable out-of-pocket expenditures incurred in connection with its performance hereunder, provided that they are consistent with applicable expense policies of Andersen.

(b) ~~To the extent possible, all airline and lodging reservations shall be made by Andersen travel coordinators in the ________________ office or other Andersen offices, as appropriate. Out-of-town travel shall require advance approval by Andersen.~~

(c) Out-of-pocket expenses will be reimbursed ~~monthly~~ when invoiced based on actual expenditures incurred. Airline travel will be reimbursed only at coach air fare. Requests for reimbursement shall be presented on a form and in a manner prescribed by Andersen and shall be accompanied by (i) supporting documentation as required by Andersen and (ii) a stipulation by Consultant that it is entitled to such reimbursement and is in compliance with all provisions of this Agreement.

(d) Andersen shall provide such reasonable office space, computer resources, materials, facilities and other support to assist Consultant in its performance hereunder as is mutually agreed to by the parties.

6. Records.

Consultant shall maintain records relating to its performance under this Agreement and to expenses incurred in connection therewith and shall provide Andersen access to such records upon request during normal business hours.

7. Consultant's Covenants

Consultant covenants to Andersen as follows:

(a) in performing the Services hereunder, it will comply at all times with all applicable laws and regulations of the United States and any jurisdiction in which it performs the Services hereunder;

(b) in performing the Services hereunder, it and its employees and agents will comply with all applicable Andersen policies and standards and shall perform the Services in a manner consistent with the ethical and professional standards of Andersen;

(c) it, its employees and agents will comply at all times with all security provisions in effect from time to time at Andersen premises or any Andersen client's premises, with respect to access to premises, and all materials belonging to Andersen or its clients;

(d) it will perform the Services hereunder in a good and professional manner; and

(e) Consultant shall not use Andersen's name in any promotional materials or other communications with third parties without Andersen's prior written consent.

8. Confidentiality.

During the course of performing the Services for Andersen, Consultant may have access to information that (a) relates to Andersen's and/or its client(s)' past, present, or future research, development, or business activities and any proprietary products, materials, services, or technical knowledge, and (b) is regarded as confidential by Andersen ("Confidential Information"). In connection therewith, the following subsections shall apply:

(a) The Confidential Information may be used by Consultant only to assist Consultant in connection with its providing of the Services;

(b) Consultant will not, at any time, without the prior written consent of Andersen, use the Confidential Information in any fashion, form, or manner, except in its capacity as an independent consultant to Andersen hereunder;

(c) Consultant agrees to protect the confidentiality of the Confidential Information in the same manner that it protects its own confidential information of like kind. Access to the Confidential Information shall be restricted to those of Andersen's and Consultant's personnel engaged in a use permitted hereby and Consultant shall not disclose Confidential Information to any third party;

(d) The Confidential Information may not be copied or reproduced without Andersen's prior written consent;

(e) Unless otherwise expressly authorized in writing by Andersen, all Confidential Information made available to Consultant, including copies thereof, shall be returned to Andersen upon the first to occur of (a) termination of this Agreement or (b) request by Andersen; and

(f) Nothing in this Agreement shall prohibit or limit Consultant's use of information (including, but not limited to, ideas, concepts, know-how, techniques, and methodologies) (i) previously known to it, (ii) independently developed by it, (iii) acquired by it from a third party which is not, to Consultant's knowledge, under an obligation to Andersen not to disclose such information, or (iv) which is or becomes publicly available through no breach by Consultant of this Agreement.

9. Ownership.

All materials prepared by Consultant for Andersen pursuant to this Agreement shall be owned exclusively by Andersen and shall be deemed works made for hire. In the event any such materials may not, by operation of law, be works made for hire, Consultant hereby assigns to Andersen all rights in such materials and copyrights therein. Consultant further shall disclose to Andersen all discoveries, inventions, ideas or techniques ("Inventions") made by it, its employees and agents, in the performance of the Services hereunder, provided that either the conception or reduction to practice occurs during the term hereof and in the performance of the Services hereunder. All such Inventions shall be the exclusive property of Andersen. Consultant will acquire from its employees and agents who may be engaged in the performance of the Services under this Agreement all such rights as may be necessary so that Andersen will receive the rights hereby agreed to be conveyed and vested in it, free of any claims of such employees and agents. Consultant shall execute such documents, and provide such assistance as Andersen may reasonably request to give full effect to the provisions of this Section 9 (at Andersen's expense).

10. Indemnification.

Consultant shall indemnify and hold Andersen, its employees and agents, harmless from and against any claims, demands, loss, damage or expense (a) related to bodily injury or death of any person or damage to property resulting from the negligent or willful acts or omissions of Consultant, its employees and agents, (b) resulting from any determination that Consultant is not an independent contractor, (c) related to claims by any employees or agents of Consultant for injuries or damages under workmen's compensation or similar acts, or (d) incurred by

Andersen based on any claim that any deliverable or other materials delivered under this Agreement or use thereof by Andersen infringes any copyright, trade secret or other proprietary right of any third party.

11. Term.

This Agreement shall be effective as of Jan 18 1993, and shall terminate on Aug 31, 1993, unless the term hereof is extended pursuant to express written agreement of the parties.

12. Termination.

(a) Andersen may, upon giving fourteen (14) days written notice identifying specifically the basis for such notice, terminate this Agreement for breach of a material term or condition of this Agreement, provided Consultant shall not have cured such breach within the fourteen (14) day period.

(b) Either party may at any time and without cause terminate this Agreement upon giving thirty (30) days written notice to the other party. In the event of such termination, Consultant shall be entitled to payment of all fees and reimbursement of expenses, as provided in Sections 4 and 5 respectively, incurred prior to the effective date of such termination.

(c) Upon termination of this Agreement for any reason, Consultant will cease all work and shall promptly provide to Andersen, without cost to Andersen, all work product and files developed by Consultant under this Agreement and all materials provided to Consultant by Andersen in connection with this Agreement.

13. Assignment.

This Agreement may not be assigned by either party nor may Consultant's obligations hereunder be subcontracted, except upon express prior consent in writing of the other party.

14. Waiver.

Failure of either party to enforce any of the provisions of this Agreement, of any rights with respect thereto, or failure to exercise any election provided for herein, shall in no way be considered a waiver of such provisions, rights or elections, or

in any way affect the validity of this Agreement. The failure of either party to enforce any of said provisions, rights or elections shall not prejudice such party from later enforcing or exercising the same or any other provisions, right or elections which it may have under this Agreement.

15. Notices.

Any payment, notice, consent or other communication given pursuant to this Agreement shall be in writing and shall be effective when delivered personally to the party for whom intended, or five (5) days following deposit of the same into the United States mail (certified or registered mail, return receipt requested, or first class mail postage prepaid), addressed so such party as set forth below or as either party may designate by written notice given to the other party in accordance herewith.

If to Andersen: 69 W. Washington
Chicago IL 60602

Attention: Scott Morrison

If to Consultant: INPUT - 400 Frank Burr Blvd
Teaneck NJ 07666
c/o T. OFlaherty

16. Severability.

If any term or provision of this Agreement shall be found by a court of competent jurisdiction to be invalid, illegal or otherwise unenforceable, the same shall not effect the other terms or provisions hereof or the whole of this Agreement, but such term or provision shall be deemed modified to the extent necessary in the court's opinion to render such term or provision enforceable, and the rights and obligations of the parties shall be construed and enforced accordingly, preserving to the fullest permissible extent the intent and agreements of the parties herein set forth.

17. Force Majeure.

Neither party shall be liable for any delays or failures in performance due to circumstances beyond its control.

18. Complete Agreement.

This Agreement sets forth the entire understanding between the parties hereto and supercedes all prior agreements, arrangements and communications, whether oral or written, with respect to the subject matter hereof. No other agreements, representations, warranties or other matters, whether oral or written, shall be deemed to bind the parties hereto with respect to the subject matter hereof. Consultant acknowledges that it is entering into this Agreement solely on the basis of the agreements and representations contained herein. This Agreement may not be modified or amended except by the mutual written agreement of the parties. Captions appearing in this Agreement are for convenience only and shall not be deemed to explain, limit or amplify the provisions hereof.

19. Governing Law.

This Agreement shall be governed by and construed in accordance with the laws of the State of [Illinois].

IN WITNESS WHEREOF, the parties have duly executed this Agreement as of the day and year first above written.

[ANDERSEN]
By Scott Mannin
Title
Date 1-18-93

INPUT
[CONSULTANT]
By
Title VP
Date 1/19/93

0431c

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: 1/19/92

To: Name: Scott Momsa

Tel./Location: 507-5666

Co.:

Fax No: 312 507 2548

From: T. C Flaherty

Subject: Confidentiality Agreement

Confidential: Y / N

Urgent: [✓ Y] / N

Page: 1 of 9

File: Chron

Contact

Other:

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***   ACTIVITY REPORT    ***
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TRANSMISSION OK

TX/RX NO.	1115
CONNECTION TEL	13125072548
CONNECTION ID	
START TIME	01/19 13:08
USAGE TIME	04'27
PAGES	9
RESULT	OK

Report

PACKAGED SOFTWARE PLANS IN SELECTED PROCESS MANUFACTURING SECTORS

Revised January 29, 1993

Prepared for:

Andersen Consulting

Prepared by:

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

INPUT

PACKAGED SOFTWARE PLANS IN SELECTED PROCESS MANUFACTURING SECTORS

I. EXECUTIVE SUMMARY

A. Background

This report summarizes several studies which have examined the market for packaged applications software in the process manufacturing sector.

Much of the material and conclusions are based on primary interview research which INPUT conducted between July and November 1992. During that period INPUT interviewed 114 companies in the food, drug and chemical industries. The analysis contains information from 278 mission-critical applications in those companies.

This summary covers the following topics:

- Overall market size and segmentation
- Buyers values, covering applications, technology and the role of the end user.
- Competitive environment

B. Market Size and Segmentation

This market is not a uniform market. The market varies appreciably in terms of

- The average expenditure per application (from $250,000 in medium-sized chemical companies to $3 million per application in large drug companies)
- The average number of high priority applications per company (from around three per company in most medium-sized companies to five in the larger food and drug companies).
- The number of potential customers (i.e, about 15 large drug companies and about 1,000 medium-sized food processing establishments)

Over the next three years, INPUT estimates that approximately $1 billion will be spent on packaged software in these three target industries (Exhibit I-1).

- These figures are limited, to the extent possible, manufacturing applications within these companies. (Note: These figures exclude hardware expenditures.)
- As Exhibit I-1 shows, about half this figure is in the smaller food processors: This is largely a function of the number of such establishments. The other segments are roughly the same size from a potential revenue standpoint.
- This money may not all be spent; much depends on whether applications meet constantly evolving user needs.

C. Buyer Values

1. Application Focus

Applications with a high degree of "manufacturing" content are those with the highest planned replacement rates. Across the segments measured, there was a fairly constant planned replacement rate of 30% to 40%. The principal applications are the following:

- Plant operations
- Environmental, health and safety
- Customer service
- Resource planning
- Product management

Financial and accounting products are often associated with one or more of the above in the replacement process; however, it is generally the manufacturing applications which drive replacement.

A substantial majority of companies are planning to use software packages as their replacement vehicle.

- Almost 80% of companies interviewed saw a 75% or greater probability of using a software package as their new application.
- Two-thirds of the companies that were less certain of their use of packages would be more likely to use a package if the package was flexible and tailorable.
- The replacement rate compares to a current market share of around 50% for software products (the rest is made up of custom application built in-house or by a vendor).

2. Technology and Other Selection Factors

Technology features (such as client/server) are important to a majority of companies. However, functional issues are even more important, such as ease of integration, standards and built-n features (see Exhibit I-2).

Based on this, and other, research INPUT expects "pure" technology to be less of an attraction as application control shifts even further into end user hands.

Even among technologists, the application benefits of technologies like client/server or object-oriented design are not yet clear

- This uncertainty is partly a question of customers not being fully current on leading edge technology issues.
- Even where customers are informed, there is doubt over whether the actuality of technology will live up to the promises. Many enthusiasts have been sobered by the performance of CASE, for example.

Technology-based solutions will have to demonstrate their effectiveness.

3. The End User Role

One of the most important long term issues is the increased importance of the end user departments in the application selection process.

- Exhibit I-3 shows that in even smaller food processors that the end users have primary decision making in half the companies.
- This percent increases to 70%-80% in the larger companies.
- This trend is expected to continue by all involved.

The involvement of end users has several implications:

- Obviously, the sales process no longer stops at the IS department. (Sometimes it may not even include IS.)
- The process itself will often be different. Functional units are less interested in formal short lists and, even where objective selection criteria exist, they may not be followed.
- More subtilely, end users will be looking for different things from software products (and their vendors). INPUT research in other areas has shown, for example, that application product vendors are valued for their perceived ability to produce a solution, rather than individual characteristics of the package.

D. Competitive Environment

SAP is commonly viewed as the leading vendor in this area (Exhibit I-4). This is undoubtedly true, from the standpoint of SAP's market share among large companies. However, midrange vendors such as J.D.Edwards are quite strong in smaller companies and divisions of large companies.

However, no vendor has a lock on the future market:

- SAP has to prove itself outside of the MVS market.
- All vendors have to prove themselves in a true client/server setting.
- The AS/400 has proved to be a very desirable platform for several firms (Such as J.D. Edwards). However, the AS/400 may prove to be less desirable as an entry into distributed or cooperative applications. At the very least, the turmoil that IBM is going through may produce problems for AS/400 applications developers for reasons outside their control.

Exhibit I-1

Estimated Expenditures per Segment on Packaged Software for Priority Manufacturing Applications: 1993-1995

Industry	Medium Companies ($100-$999 MM)	Large Companies (Over $1 Billion)	Total ($MM)
Drug	110	60	170
Food	500	130	630
Chemical	100	110	210
Total	710	300	1,010

Exhibit I-2

IMPORTANCE OF SOFTWARE PACKAGE EVALUATION CRITERIA

Criteria	Importance (% Respondents Rating 4 or 5*)
Easy to integrate	88%
Conforms to standards	77%
Extensive Built-in Features	76%
Vendor reputation	74%
Full Installation Support	69%
Client/Server Technology	68%
Software Modifiable by Customer	62%
Hardware Independent	56%
Vendor-provided Product Modifications	52%

*1 = lowest importance, 5 = highest importance

Exhibit I-3

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

	Company Size*	
Industry	Medium	Large
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit I-4

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

II. BACKGROUND AND METHODOLOGY

A. Background

This report is a summary of research conducted for Andersen Consulting in July-December 1992.

- In July 1992 INPUT conducted research to understand software purchase rate profiles among potential customers. Two sectors were selected: utilities and food processors. The questionnaire used is in Appendix A.
- This information, along with other information on "Best Bet" software product opportunities and market entry build-up analyses, was reviewed at a worksession in Chicago on August 13, 1992. This material was later summarized in a written report in September 1992.
- This report has extracted material from the August and September analyses on food processor purchasing plans.

As a follow-on to the July/August research, INPUT conducted additional, expanded research in the chemical and drug industries in October and November 1992.

- This additional research went into more detail on specific applications plans. The questionnaire used is in Appendix B.
- The results from this research were reported to Andersen in a draft written report dated November 16, 1992.

This report below combines the material from the November report as well as appropriate material on the food processing sector from the earlier work.

The food processing data is comparable at the industry segment level

At the application level INPUT makes observations in this report on the extent to which the food processing industry's profile is similar to those of the drug and chemical sectors.)

B. Methodology

The material reported on here was obtained from telephone interviews conducted with 114 companies. The distribution of interviews is shown in Exhibit I-1.

- Respondents were those knowledgeable concerning the applications plans and directions of their company.
    - Usually, the respondents were connected with the central IS department, even though the responsibility for applications planning and/or implementation was often located elsewhere.
    - INPUT has found -- in this and other studies -- that the central IS organization is still a good place to obtain corporate-wide information, even if IS is not fully informed on all details.
- Companies were further divided into "medium" and "large" entities ("medium being revenues between $100 and $999 million). Where divisions of large entities operate independently, they were classified as "medium" for the purposes of this analysis.

Within each company INPUT focused on mission-critical applications: for the drug and chemical industries, these were primarily targeted from a specific list agreed to by INPUT and Andersen prior to the survey; for the food processing sector, the respondents selected applications without prompting. The data contains information on 278 mission-critical applications.

In general, INPUT found the respondents were open and forthcoming concerning their companies' plans. In some cases, as noted above, the respondent was not fully informed concerning decentralized applications plans; however, the decentralized units in this sort of situation are often no more able to precisely define their future plans.

Exhibit II-1

Interview Distribution

Industry	Company Size		
	Medium	Large	Total
Chemical	22	24	46
Drug	21	16	37
Food Processing	13	18	31
Total	56	58	114

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

III. FUTURE APPLICATIONS

This section reports on:

- The planned rate of applications replacement
- The extent of software package usage (versus custom development, whether performed in-house or by a vendor)

A. Replacement Plans

Respondents have seen an increased rate of applications change in the last five years (Exhibit II-1). Large drug companies have seen the largest amount of change.

An analysis of priority applications shows that over one-third are expected to be replaced in the next five years (Exhibit II-2). An additional tenth are currently in the process of being replaced.

This picture is virtually unchanged when the secondary applications (financial and other) are excluded (Exhibit II-3). This replacement rate is very similar across all manufacturing-oriented applications.

B. Package Usage

Currently, packages are used in about 40% of priority applications (Exhibit II-4). Drug companies are more likely to use packages now.

A striking finding is that where a replacement is currently planned, over three-quarters of drug and chemical companies see a high probability of using a package (Exhibit II-5). [Study data is not exactly comparable for food processors. However, their software product replacement rates should be similar, given overall trends (Exhibit II-6).]

Another important finding is that where companies are less likely to use a package, the probability of use increases markedly if the package were "more flexible and tailorable than the current generation of software packages." (Exhibit II-7). Potentially, almost all new applications could use packages as a base.

Exhibit III-1

Percent of Companies with Increased Rate of Application Change/Replacement in Last Five Years

	Company Size*	
Industry	**Medium**	**Large**
Chemical	76	71
Drug	57	88
Food Processing	54	72

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit III-2

Replacement Status for Priority Applications
All Applications

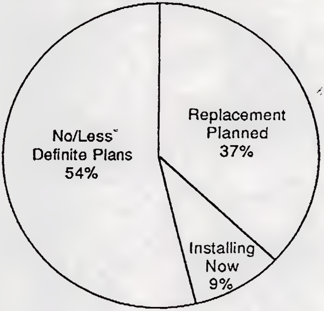
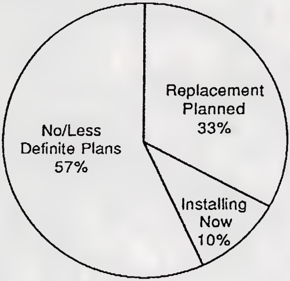


Exhibit III-3

Replacement Status for Priority Applications
Targeted Manufacturing Applications



N = 124

Note: Omits financial and "other" applications

Exhibit III-4

CURRENT PACKAGE USE IN TARGETTED APPLICATIONS

All Firms	40%
Chemical Companies	32%
Drug Companies	52%
Food Processing Companies	38%

Exhibit III-5

Probability of Using Software Package for Planned Replacement Manufacturing Applications in the Drug and Chemical Sectors *

Probability of Using Package	% of Applications
75% or greater	78%
25-50%	10%
0 or don't know	12%
	100%

*Excluding Financial and "Other"

Exhibit III-7

Impact of Flexibility/Tailoring on Increasing Probability of Using Packaged Software

Probability of using package for planned replacement	Number of Cases	Number more likely to use package
75%	5	3 (60%)
25%-50%	4	3 (75%)
0/Don't know	5	3 (60%)
Total	14	9 (64%)

Source: Drug & Chemical Companies

IV. APPLICATION SELECTION MOTIVATORS

In the research performed for this study INPUT found that there were two distinct motivators changing application selection practices:

- Increasing end user involvement in applications in general, especially in the selection process
- Changes in technology

A. End User Involvement

As shown in Exhibit III-1, end users already have primary decision making authority over applications generally in most companies. This tends to be higher in the larger companies; this is not surprising, because the operating units are larger and can be more self-sufficient. The end user role, as perceived by the IS department is still increasing on the whole (Exhibit III-2). This perception is especially important since many IS units' interests would be better served if the opposite were the case.

These figures are even more impressive when specific applications are examined (Exhibit III-3).

- The split between large and medium sized firms is striking.
- This indicates that users are taking control of the most important applications first, leaving the less important and/or "maintenance" work to IS.

B. Impact of Technology Changes

About half of the companies say that technology changes are accelerating general applications replacement. This factor is somewhat more important in the larger companies (Exhibit III-4). Based on other work which INPUT has conducted, these are generally feelings influenced by downsizing in general.

However, when questioned on the importance of incorporating new technologies into specific applications, the response was lukewarm at best (Exhibit III-5). Even client/server and cooperative processing received a relatively low response. (The apparently higher ratings for environmental and resource planning is probably a result of small sample sizes.)

INPUT believes that these ratings are low because:

- Many respondents are not very well informed on the quickly-changing technology issues involved.
- Even when respondents are reasonably well informed on technology issues they will have difficulty relating the technology to changes in a specific application.

INPUT expects this problem to become more acute as user departments assume more influence and as vendors begin making more technology claims.

Exhibit IV-1

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

	Company Size*	
Industry	**Medium**	**Large**
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit IV-2

Role of Users Is Increasing (As Perceived by IS)

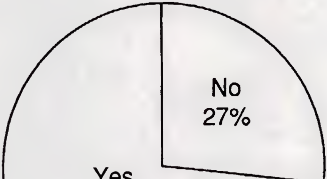


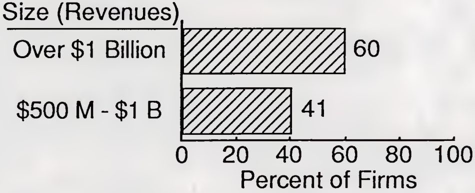
Exhibit IV-3

Percent of Time User Department is Main Decision Maker for Specific Applications in the Chemical and Drug Sectors

	Size of Company	
Application	Medium	Large
Plant Operations	27%	75%
Environment/Health	67%	100%
Customer Service	32%	64%
Resource Planning	40%	100%
Product Management	33%	75%
Industry (as a group)		
Chemical	30%	82%
Drug	50%	71%
All (Not weighted)	40%	78%

Exhibit IV-4

Technology Change Accelerating Applications Replacement



Source: Interviews with 67 IS departments

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SP-228

Exhibit IV-5

Importance of Incorporating Technologies into Manufacturing Applications

Technology	Plant Op	Env	Cust Serv	Res Plan	Prod Mgt	Avg. *
Client Server	3.1	3.8	3.4	3.7	3.1	3.3
Embedded CASE	2.6	2.4	2.6	2.3	2.6	2.6
Objected-Oriented	2.4	2.4	2.6	2.9	2.6	2.6
AI	2.3	2.3	2.3	1.7	2.1	2.2
Cooperative Processing	3.1	3.1	3.1	2.3	3.1	3.0
Number of Interviews	41	14	37	9	15	

* Not weighted; 1 = Not important 5 = Very Important

V. APPLICATION PRIORITIES IN MANUFACTURING

For the chemical and drug sectors INPUT prepared a list of applications for which respondents rated the importance ("Principal Focus" group in Exhibit IV-1). In addition, many respondents volunteered other applications ("Secondary Focus" group in Exhibit IV-1).

Two applications stood out as being of primary importance: customer service and plant operations, being cited by over two-thirds of respondents (Exhibit IV-2, "Priority Group A").

A second group of applications was seen as important by about half of respondents: product management, environmental/health and resource planning (Exhibit IV-3, "Priority Group B")

The third group ("Priority Group C" in Exhibit IV-4) is made up of the more important applications that were volunteered. These include financial systems, distribution/logistics and order entry. INPUT believes that these applications would probably be rated somewhat higher if all respondents had been asked to specifically rate them:

- A few applications may have been overlooked by respondents when they were volunteering priorities.
- Other applications may have been viewed by respondents as being integral to principal applications (e.g., financial or distribution/logistics as part of plant operations).

Sales and marketing applications are important for drug companies and not important to chemical companies (Exhibit IV-5). INPUT believes the profile for food processors would be similar to drug companies, especially in the importance of sales and marketing applications.

Large drug companies cited an average of 4.8 priority applications per company. Other classes of companies averaged about 3.5 applications per company.

As cited in Chapter III, replacements are planned for over one-third of priority applications overall. This percentage does not vary substantially for individual applications.

Exhibit V-1

Application Focus

Principal Focus

Plant operations
Environmental, health and safety
Customer service
Resource planning
Product management

Secondary Focus

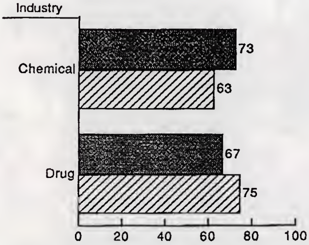
Financial/accounting
Order entry
Distribution
Sales and marketing
Other (e.g., Bar coding, EDI, imaging, maintenance, POS)

Note:

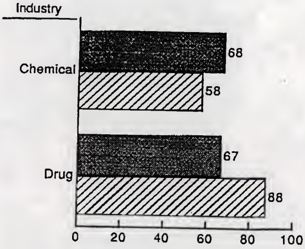
- Respondents specifically questioned on status of "principal" applications.
- "Secondary" application status was volunteered

EXHIBIT V-2

PRIORITY GROUP A: CUSTOMER SERVICES AND PLANT OPERATIONS



PERCENT OF COMPANIES
CITING PLANT OPERATIONS
AS A PRIORITY APPLICATION



PERCENT OF COMPANIES
CITING CUSTOMER SERVICE
AS A PRIORITY APPLICATION

Size: ▩ $100 Million - $1 Billion

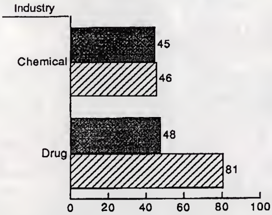
▨ Over $1 Billion

Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

EXHIBIT V-3

PRIORITY GROUP B: PRODUCT MANAGEMENT, ENVIRONMENTAL/HEALTH, AND RESOURCE PLANNING

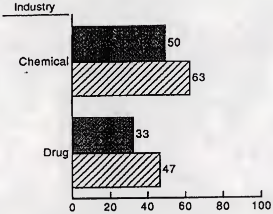


PERCENT OF COMPANIES CITING PRODUCT MANAGEMENT AS A PRIORITY APPLICATION

Size: ▩ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 55%

Source: Surveys of 83 chemical and drug companies/divisions

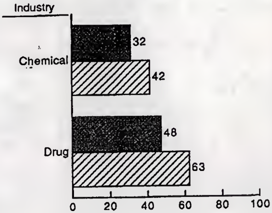


PERCENT OF COMPANIES CITING ENVIRONMENTAL, HEALTH, SAFETY, AND TRAINING AS A PRIORITY APPLICATION

Size: ▩ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 48%

Source: Surveys of 83 chemical and drug companies/divisions



PERCENT OF COMPANIES CITING RESOURCE PLANNING AS A PRIORITY APPLICATION

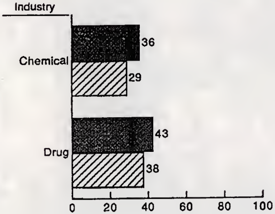
Size: ▩ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 46%

Source: Surveys of 83 chemical and drug companies/divisions

EXHIBIT V-4

PRIORITY GROUP C: FINANCIAL SYSTEMS, DISTRIBUTION/LOGISTICS, AND ORDER ENTRY

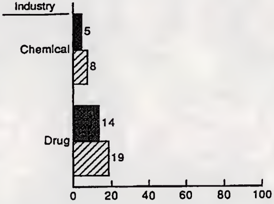


PERCENT OF COMPANIES VOLUNTEERING FINNCIAL SYSTEMS AS A PRIORITY APPLICATION

Size: ■ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 37%

Source: Surveys of 83 chemical and drug companies/divisions

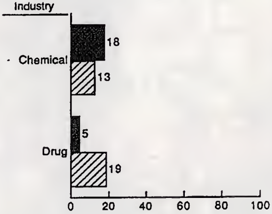


PERCENT OF COMPANIES VOLUNTEERING DISTRIBUTION/ LOGISTICS AS A PRIORITY APPLICATION

Size: ■ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 12%

Source: Surveys of 83 chemical and drug companies/divisions



PERCENT OF COMPANIES VOLUNTEERING ORDER ENTRY AS A PRIORITY APPLICATION

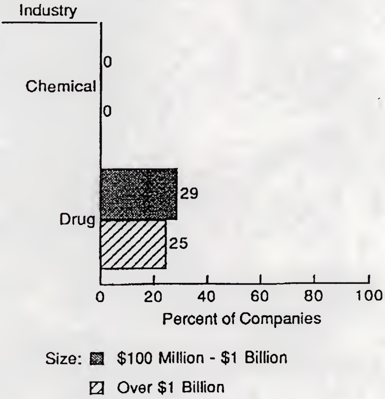
Size: ■ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

Exhibit V-5

Percent of Companies Citing Sales and Marketing as a Priority Application



Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

VI. SOFTWARE PRODUCT EXPENDITURES

A. Spending by Type of Application

Drug and chemical respondents were asked to estimate the amount that they thought would be invested in software and people costs for particular priority applications over the next five years. Exhibit V-1 shows average spending per application.

- Not surprisingly, large companies are expecting to spend more than medium-sized companies for each application.
- Drug companies plan higher rates of spending per application than chemical companies.

Exhibit V-2 shows spending by application (across chemical and drug companies). Customer service and product management are shown to be the applications with the most spending planned. INPUT expects that food processing companies would have profiles similar to drug companies.

Several cautions should be provided on this data:

- Respondents were generally forthcoming, but often did not know all planned spending (either because they were not totally in the knowledge loop or, more often, because spending plans were part of larger departmental plans that were evolving).
- Figures are order of magnitude and usually ranges.
- While five year figures were requested, INPUT believes that in most cases these figures represent spending over the next 2-3 years.

The net result of these factors is that the figures in Exhibits V-1 and V-2 may be conservative.

B. Market Size Estimates

Exhibit VI-3 takes the average number of priority applications times the average spending per applications to produce an average expenditure per company on priority applications for each segment.

Exhibit VI-4 adjusts the average expenditure per company to average packaged software spending per company and multiplies this by the number of companies in each segment. This produces a market size per segment over the 1992-1995 period.

- As noted above, this figure may be conservative, since not all spending plans could be identified in the research.
- This is balanced by the very real possibility that not all the planned spending may take place: The packaged applications have to be useful ones that meet user needs. In many cases those requiring a new application have not yet come up against the deficiencies of current products in the marketplace.

Exhibit VI-1

Average Spending on Drug and Chemical Applications by Company Size

	Size of Company	
Application	**Medium**	**Large**
Plant Operations	\$250K	\$1 million
Environment & Safety	\$250K +	\$750K +
Customer Service	\$1 million +	\$3 million +
Product Management	\$500K +	\$750K

- Excludes resource planning (insufficient data)
- Based on estimates for 48 applications

Exhibit VI-2

Average Spending per Application By Industry and Company Size

	Size of Company	
Industry	**Medium**	**Large**
Chemical	$250K	$750K
Drug	$1 million +	$3 million +

- Includes plant operations, environment and safety, customer service resource planning, product management
- Based on estimates for 53 applications

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EXHIBIT VI-3

AVERAGE EXPENDITURES PER SEGMENT ON PRIORITY APPLICATIONS

	MEDIUM COMPANIES			LARGE COMPANIES		
INDUSTRY	AVERAGE # OF PRIORITY APPLICATIONS X	AVERAGE SPENDING PER APPL. ($MM) =	AVERAGE EXPENDITURE PER CO. ($MM)	AVERAGE # OF PRIORITY APPLICATIONS X	AVERAGE SPENDING PER APPL. ($MM) =	AVERAGE EXPENDITURE PER CO. ($MM)
DRUG	4	1.0	4.0	5	3.0	15
FOOD	3	.75	2.25	5	2.0	10
CHEMICAL	3	.25	.75	4	.75	3

EXHIBIT VI-4

EXPENDITURES BY SEGMENT ON PACKAGED SOFTWARE FOR PRIORITY APPLICATIONS: 1993-1995

	MEDIUM COMPANIES			LARGE COMPANIES			
INDUSTRY	AVERAGE SPENDING/CO. ON APPLIC. PKGS ($MM)* x	NUMBER OF COMPANIES** =	APPLICATION PACKAGE EXPENSE ($MM)	AVERAGE SPENDING/CO. ON APPLIC. PKGS. ($MM)* x	NUMBER OF COMPANIES =	APPLICATION PACKAGE EXPENSE ($MM)	TOTAL
DRUG	.75	150	110	3.75	15	60	170
FOOD	.50	1000	500	3.75	35	130	630
CHEMICAL	.20	500	100	3	35	110	210
TOTAL			$710			$300	$1010

* 75% OF TOTAL APPLICATION SPENDING

** ESTABLISHMENTS - INPUT ESTIMATE FROM DEPT. OF COMMERCE DATA

VII. COMPETITIVE ENVIRONMENT

A. Overview

SAP is the current leader in terms of functionality, market share and "mind share". In addition to Andersen, there are four other primary competitors (Exhibit VII-1) as well as several secondary competitors and EDS and Oracle who are potential primary competitors.

However, even SAP does not have a lock on the market: With an MVS product, it is limited to the large scale system, generally inside large companies. Arguably, the delay in r/3 and consequent lost momentum have stopped SAP from becoming the market leader.

- J.D. Edwards is very well placed in the midrange market and from a functionality standpoint comes close to what SAP offers.
- No firm now offers what could be termed true distributed or cooperative processing. Edwards, for example, calls its product "client/server", even though it is on the AS/400 platform.

INPUT believes that this market is in fact quite open to products vendors with these characteristics:

- Provided by a vendor large enough to weather one bad mistake (Datalogix probably could not for example).
- Offered on a client/server architecture (arguably all but possibly Oracle and Ingres would fail this test)
- Committed to the process market (IBM, D & B, SSA, EDS and Oracle are doubtful by this measure)

The following sections assess the strengths and weaknesses of the major vendors as well as an assessment on their futures. (The vendors are listed alphabetically.)

B. ASK

Strengths

- Historic strong position in discrete manufacturing
- Ingres allows tailoring of functions for process applications
- Runs on multiple midrange platforms
- Have made modifications from discrete MRP for process budgeting, forecasting and tracking
- Ingres could serve as long term means of adding client/server functions to applications

Weaknesses

- Ingres commitment probably more of a distraction than a net contributor: An alliance could have produced most or all of benefits (example: NCR and DBMS companies)
- Older technology overall
- Company does not have a great deal of process knowledge and no easy means of getting it (unlike Oracle, with an in-house consulting arm)
- So far, the process components are viewed as add-ons

Futures

- Ingres' strategic commitment is to manufacturing market: It must expand into process
- Similarly, its Ingres investment has to migrate to new technologies.
- This combination means that ASK will remain as a strong, but secondary, competitor

C. Datalogix

Strengths

- A process manufacturing software specialist
- Long-established on various traditional midrange platforms (CIMPRO)
- Recently began offering GEMMS on various UNIX platforms -- objective is a product that runs on multiple hardware platforms in multiple plants. Still in beta.
- Good front end for chemical, energy; adds value in formula management

Weaknesses

- GEMMS still an unknown.
- UNIX platform may prove limiting, especially considering position of AS/400 (which has not been seriously affected so far by UNIX platforms)
- As a fairly small company ($20MM), it cannot afford a product failure.

Futures

- Must remain a competitor (or go out of business)
- Unlikely that UNIX offering can threaten SAP

D. D & B Software

Strengths

- Installed customer base

Weaknesses

- Mainframe orientation; very slow and unsuccessful efforts to break out
- Process offerings offer a limited set of functions based on discrete products
- Overlapping product lines generally from past acquisitions only now being sorted out. Produces confusion among customers and among developers.
- General financial applications and, next, discrete applications take precedence
- Client/server "strategy" depends on third party enabling products and a complex transition strategy: Many things can go wrong

Futures

- Unlikely to be a serious competitor for the foreseeable future

C-L ; Analysis of Specific Vendors

Electronic Commerce Client/Server Applications

Catalogs and Directories (pre-transaction; buyer is user)

Segment	'92-'93 Growth (Percent)	'92 Sales ($ Millions)
Catalogs	37	130
Directories	42	12

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E. J.D. Edwards

Strengths

- Similar functionality to SAP
- Offers full set of financial and discrete functionality
- Large enough company to support full application range
- Even though products run on an AS/400 platform, marketed as a "client/server" product

Weaknesses

- AS/400 platform is both a strength and a weakness: Could lose popularity for reasons outside of Edwards' control.

Futures

- An excellent combination of a specialist that has reached critical mass from a size and market standpoint.
- Is well-positioned to take on r/3.

F. EDS

Strengths

- Very aggressively building its manufacturing presence:
    - McDonnell-Douglas acquisition
    - Investments/alliances with ASK, Consilium, Sherpa
- Resources, people

Weaknesses

- Little activity so far in process software
- In general, EDS has not been successful in software products; services are far more likely to gain support internally
- Alliances are a two-edged sword

Futures

- Will probably not become a major software product competitor

G. IBM

Strengths

- Renewed emphasis on industry orientation at local levels
- Closer linkage between software products, services and other offerings in Trading Area organization
- Increased range of manufacturing software offerings (CIM/400 as general manufacturing product; POMS; PRISM - co-marketed with Marcam)

Weaknesses

- Many opportunities for product and marketing conflicts
    - No longer strong central industry management
    - Trading Areas may not have critical mass to support industry niches
- Product focus is fuzzy, especially between IBM products and partner products

Futures

- Very unclear

H. Marcam

Strengths

- Process software specialist
- PRISM is an established AS/400 product; recently expanded to MS-DOS
- Also agent/consultant for MAPICS
- Good critical mass ($60MM)

Weaknesses

- As with J.D. Edwards, being tied to AS/400 is a strength and a weakness.

Futures

- Will remain a viable competitor, but is unlikely to overtake J.D. Edwards

I. Oracle

Strengths

- Enormous installed base; customers reasonably well-disposed toward Oracle
- Applications in general have become a priority, as part of a reasonable strategy.
- Oracle's evolving architecture is heading in the right direction.
- Excellent sales organization generally; learning about applications.
- New UNIX/MS-DOS products
- Application feedback from consulting organization

Weaknesses

- Process is not a priority now.
- Probably still behind the knowledge curve

Futures

- Oracle will keep up with technology.
- Will Oracle be able to accelerate its knowledge of process applications?
- Is unlikely to be a major process competitor in the medium term

J. Ross Systems

Strengths

- Promix acquisition
- Strength in food industry

Weaknesses

- Older system, written in odd language (Gembase)
- An add-on product, not integrated with other offerings

Futures

- Unclear if acquisition was opportunistic or strategic.
- A narrow base to assault the process market.
- Unlikely to be a major competitor

K. SAP

Strengths

- Dominant position in large companies (both market share and "mindshare")
- Includes all components: Planning, shop floor, accounting, distribution. (Only J.D. Edwards is currently competitive.)
- Beginning to build niche function libraries (e.g., has over 100 functions aimed at oil industry). ABAP 4GL helps address end users from a functional standpoint (developed in C++).
- r/3 can be configured to look like client/server (as an X-window terminal) -- presentation, DBMS and applications modules.

Weaknesses

- Transition from r/2 to r/3 has been slow.
- Unclear if recent management shakeup will affect growth and ability to support clients.

Futures

- Is the benchmark in process software.
- r/3 is now UNIX and Sun-oriented. Windows/OS/2 is next.
- HP, DEC (Alpha), RS6000 on horizon

L. System Software Associates

Strengths

- Discrete core of capabilities

Weaknesses

- Limited process functionality
- AS/400 is strength and weaknesses

Futures

- Unlikely to be a major player

Exhibit VII-1

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

Appendix A

MISSION CRITICAL APPLICATIONS STUDY

My name is ____________________. I'm with INPUT, a research and consulting firm in Teaneck, New Jersey. We are conducting a study on why and on what cycle companies replace their mission-critical applications. All the information you provide will be kept confidential, as well as your name and your company's name. In return for your assistance, we will send you a summary of the completed study at no charge.

1a. First of all, what are your five most important applications today? (in order of importance).

1b. How will this list change in five years, either in terms of their order on the list, or by the adding of new applications?

	1992	1997
1.	____________________	____________________
2.	____________________	____________________
3.	____________________	____________________
4.	____________________	____________________
5.	____________________	____________________

1c. What are the reasons for these changes?

2. Next, I would like to understand more about four of these applications. **[Select as follows: If there were applications added to the 1997 list, take the top two additions, plus the two most important from 1992; if only one was added, take that, plus the top three for 1992; otherwise, the top four in 1992]**

Use one of the attached "Applications Sheets", for each application

____________________ APPLICATION

A. What is the source of this application?

In-house developed ________

Custom developed by a contractor ________

A commercial software package ________
(Name - __________________)

Other (e.g., combination of above, developed by parent company) [describe]

B. Why was this source chosen?

C. What other sources were considered?

D. What year was it installed?

E. What was the time to implement? (From completion of requirements to successful use?)

F. Approximately how much were the implementation costs? (Including design, testing, installation, software licences, but excluding hardware)? [Can prompt with following]

Under $100,000	______	$1-5 M	______
$100K - 500K	______	$5 - 10 M	______
$500K - $1 M	______	Over $10 M	______

G. What were the three most important reasons for installing this application? (What were the underlying business reasons?)

1. ____

2. ____

3. ____

G1. Was it part of a Quality Initiative? Yes _____ No _____

H. On a scale of 1 to 5 (with 5 being highest), how well were initial expectations for this application met? ________

Why?

I. Since installation, when have there been significant changes to the application, why were they made, and about how much did they cost?

Change/Reason	Year	Cost

J. If a software package is used, is it now under a maintenance contract?

Yes _____ No _____

Why?

K. Looking back in time, did this application replace a similar application?

Yes _____ No _____ If yes,

What was the source?

What year was this prior application installed?

Why was the application replaced?

L. Looking ahead, what significant changes, (including replacement), do you expect to make (and why), when do you expect to make them, and what do you expect the order of magnitude costs will be?

Change/Reason	Year	Cost

M. When do you expect to or want to replace the application?

3. Now I would like to ask some more general questions.

   A. Are changes and replacements cycles occurring at a different rate now, compared to say, five years ago? (e.g., percent change, reasons)

   B. What is the role of end users in producing changes to applications now as opposed to five years ago?

   C. What would you say is the split of decision making authority between IS management and users regarding the decision to replace or change application software?

   D. What impact do you see technology having on producing change in applications? (e.g., which ones, on which applications, how important, when)

   E Would technology changes, such as client/server, workstation functionality, or graphic user interface, accelerate replacement of an application independent of business process re-engineering?

4. Do you have any other comments on mission-critical applications in your organization or generally?

Appendix B

Revised Summary Report

SOFTWARE PACKAGE MODIFICATION ISSUES IN MANUFACTURING

to be Bound

[illegible]

Prepared for:

ANDERSEN CONSULTING

February 8, 1993

Prepared by:

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

INPUT

I. Management Summary

INPUT interviewed 83 manufacturing organizations to understand the relative importance and acceptance of different technologies that could assist in the modification of software packages.

One of the chief findings is that when acquiring packaged software over half of respondents placed considerable importance on modifiability -- either by themselves or as capabilities built into a software product. However, this should be put into context; a larger number of respondents placed as much or more emphasis on more "traditional" evaluation criteria such as ease of integration, features, vendor reputation or client/server technology.

- To a large extent this difference in relative shows that evaluation criteria have been changing slowly.
- Another element is that many respondents are not sure whether greatly improved modifiability is in fact achievable: To some extent, respondents had to "suspend belief" in order to rate modifiability issues.

The most important elements affecting modifiability are:

- Knowledgeable staff
- Documentation and source code

The programming language and the structure and quality of the actual code were, as a class, seen as less important. Again, these ratings largely represent experience to date, i.e.,

- Most customers have not seen that the language used in a package is a primary factor in maintainability
- In fact, up to now many packages explicitly or implicitly discourage changing or adding to the actual code.

These findings are reinforced when examining the acceptability of specific enabling technologies for improved software modifiability.

- Relational and distributed DBMS technology was rated appreciably higher than object-oriented databases or object-oriented design.
- Packages built with CASE tools ranked lowest of all.
- In INPUT's opinion, these lower ratings for object oriented and CASE are a result of lack of knowledge and experience as well as residual doubts over the applicability of the underlying technology.

In looking at the importance of specific languages for modifications, the key factor is that, to date, languages themselves are not viewed as critical elements in modifiability. With that reservation the following observations can be made:

- C++ is seen as important by about one-third of respondents.
- Cobol receives about as high a rating.
- Smalltalk is seen as important by only a small minority of respondents.

INPUT concludes from this that:

- Customer minds are still open on the language issue.
- Using C++ as a vehicle could produce higher levels of immediate acceptability.
- Customers could be convinced that there is a "better mousetrap". However, this would require an initial education effort that to be convincing would require hard evidence.

II. Methodology

INPUT interviewed IS staff in 83 manufacturing organizations in November 1992 to understand the acceptability of particular technologies, especially technologies affecting modifiability of software packages by customers. Interviews were held with companies across manufacturing. Both large (over $1 billion) and medium-sized companies (those between $100 - 999 million) were interviewed.

The questionnaire and the following analysis includes the following items.

- Replacement plans for eight specific applications (financial applications, warehouse management, factory management, human resources, order processing, MRP, engineering and procurement). This data is in Appendix A.
- Evaluation criteria used in acquiring software packages. (Note: Prior research had essentially established that utilizing software packages is a major part of most companies' plans.)
- Establishing the relative importance of potential elements to make packaged software more modifiable. These elements were specified in the interview and included:
    - Access to knowledgeable technical staff
    - Availability of documentation
    - Access to source code
    - Adherence to standards by the software package
    - The structure and quality of the code
    - The actual programming language used
- The acceptability of specific enabling technologies for ensuring improved software modifiability. The technologies which respondents were asked to rate included relational DBMS, distributed DBMS, object-oriented databases, object-oriented design, packages built with CASE tools supplied to customer, written in C++, written in Smalltalk, written in another language.
- The acceptability of specific languages was also analyzed.

The questionnaire used is in Appendix B.

III. Software Package Evaluation Criteria

Exhibit 1 shows the percent of respondents which gave high ratings for specific software package evaluation criteria. All of the criteria were seen as important by at least half the respondents.

- Ease of integration was the most important factor. There were a number of comments on this from respondents. Representative comments include:
    - "Vendors must adapt to our environment -- which is constantly changing."
    - "Vendors must have built-in flexibility in their products."
- Standards, features and vendor reputation were almost as important.
- Vendor-provided product modifications was seen as the least important, relatively speaking; however, even this factor averaged 3.4 on a scale of 5 -- a medium/high rating of importance from an absolute standpoint. INPUT believes that this is a result of lack of knowledge as well as some uncertainty over the feasibility of such offerings.

Other research that INPUT has conducted has shown similar findings.

- A recent in-depth study of how large projects were planned and awarded showed that as end users became further involved in the planning process, formal criteria as used by IS organizations became less important. (One respondent to the current study echoed this and said, "Internal customers are becoming much more independent.")
- In these end user settings, a particular factor often becomes a "knock-out" factor. These knock-out factors emerge during the review process. They are not known in advance and vary widely.
- Technical criteria tend not to be primary, in the sense that candidates must be above a certain threshold of performance. After that point, the extent to which an offering meets business requirements often becomes controlling.

IV. Elements of Modification

Respondents were asked to rank the six elements impacting modifiability shown in Exhibit 2. The issues of generalized "access" were given first or second place by almost half the respondents. ("Access" includes access to staff, documentation and source code.)

More specific elements (standards, code characteristics and the programming language used) were seen as less important. Note that the programming language used was placed last or next to last by almost half of respondents. Respondents stated repeatedly that they had no preference on the language used by an application.

The companies interviewed had many different attitudes toward modifiability, which may be one reason why the more general aspects of this issue were valued more highly. These conflicting attitudes are illustrated by the following sampling of comments:

- "We prefer to do our own modifications."
- "We don't like to spend a lot of time on modifications."
- "We don't have to make many changes to packages."
- "We are used to doing everything ourselves."
- "Vendor-provided modifications are good but expensive."
- "Installation support is not as critical as finding the right package in the first place."
- "I could go on forever on the importance of software being modifiable by customers."
- "We tend to customize packages."
- "Packages should be user-friendly."

V. Enabling Technologies for Improving Software Modifiability

Exhibit 3 shows the degree of acceptability of differing enabling technologies from the choices that were offered to respondents. DBMS-related technologies received the highest ratings and occupy the first three places on this list.

It can be argued that the choice of a DBMS (with the possible exception of an object-oriented DBMS) does not have much to do with modifiability. It should be kept in mind that modifiability, per se, is not the key factor in most of the respondents' minds (see Exhibit 1). INPUT believes that many respondents rated relational DBMSs highly because of the perception that these products are inherently flexible; "flexibility" can be seen as overlapping "modifiability".

Object-oriented databases, object-oriented design and built-in CASE tools ranked somewhat lower because respondents were dealing with immature - and rapidly changing - technologies. It was clear that many respondents were faced with the need to "suspend their disbelief" over whether or not the enabling technologies would in fact be able to deliver these benefits.

VI. Specific Languages Used in An Application

In Exhibit 2, languages as a vehicle for improved software modifiable received the lowest ratings. An equally important finding is that in general respondents exhibited a considerable lack of knowledge and, to some degree, a lack of interest in the language issue. Responses were repeatedly, "No preference", "Doesn't affect us", etc.

Exhibit 4, shows the importance of particular languages for modification purposes.

- C++ was cited the most often. This rating was at least as much a result of general impressions as actual experience. It is noteworthy that C++ was only cited when respondents were specifically asked to rate languages -- C++ was not volunteered in other parts of the interview.

- Cobol on the other hand was not only cited by 19% of respondents as important for modification purposes. but an additional 14% volunteered Cobol during other parts of the interview. Thus, the total mentions of Cobol were on about the same level as for C++. As one respondent put it, "Don't exclude Cobol."

C++ and Smalltalk are sometimes seen as competing for the same object-oriented position. C++ was cited far more often than Smalltalk. However, INPUT believes that these numbers should not necessarily be interpreted as evidence that C++ is far more acceptable than Smalltalk.

- There were relatively few volunteered observations on either language and not many more received as a result of specific probing.

- Many respondents felt that "no preference" regarding the language used meant just that.

INPUT believes that the relative size of the response between C++ and Smalltalk is tied closely to general levels of awareness. The difference between C++ and Smalltalk in this survey is consistent with overall visibility between the two:

- In a large computer subject data base there are over 1,500 entries for C++ over the last 12 months, compared to 65 for Smalltalk.

- In the software reference "Data Sources", there are over 500 products concerned with C++ and under 40 for Smalltalk.

- These ratios are strikingly similar to those found in the survey.

INPUT does not conclude from this study that new packages should be written in Cobol (although INPUT is aware of "client-server" offerings that are based in Cobol and assembler). But people are comfortable with Cobol, especially those looking at large systems and/or based in large IS departments (the source of most of the study's respondents). This is illustrated in the comments:

- "Cobol is what we have."
- "That's where my people's skills are."
- "Cobol is a world power."

As stated before, these comparative ratings for different languages should be analyzed in the overall context of the lack of preference of the underlying language used by a software package (Exhibit 2).

INPUT concludes from this that:

- Customer minds are still open on the language issue.
- Using C++ as a vehicle could produce higher levels of immediate acceptability.
- Customers could be convinced that there is a "better mousetrap". However, this would require an initial education effort that to be convincing would require hard evidence.

Appendix A

Replacement Rate for Manufacturing Applications

Exhibit A-1 shows the expected replacement rates for eight manufacturing applications.

- Respondents gave a probability of replacement for each application. On the average close to half of all applications had a probability of over 50% of replacement in the next five years.
- For each application almost a quarter of respondents sees a probability of 95% or higher of replacing the application.
- The financial group of applications has a somewhat higher probability of replacement, probably owing to having interfaces to many applications in the group: If other applications are replaced, there is increased pressure on replacing financial applications as well.

This survey did not specifically ask if respondents planned to use software packages as replacements. However, several other recent studies have established that software packages are increasingly the replacement vehicle of choice. This appeared to be the same assumption in this interview group. However, they also saw that a package would only go so far in meeting their needs, as shown by these sample comments:

- "If it's good software, it doesn't need much support, but I've never seen off-the-shelf software that doesn't need work."
- "It's hard to find a package that does 100% of what you want it to do."
- "One of our package vendors went out of business and caused us a lot of problems."

Exhibit 1

IMPORTANCE OF SOFTWARE PACKAGE EVALUATION CRITERIA

Criteria	Importance (% Respondents Rating 4 or 5*)
Easy to integrate	88%
Conforms to standards	77%
Extensive Built-in Features	76%
Vendor reputation	74%
Full Installation Support	69%
Client/Server Technology	68%
Software Modifiable by Customer	62%
Hardware Independent	56%
Vendor-provided Product Modifications	52%

*1 = lowest importance, 5 = highest importance

Exhibit 2

IMPORTANCE OF MODIFICATION ELEMENTS

Elements	Importance % Rating First or Second	Importance % Rating Fifth or Sixth
Access to knowledgeable technical staff	49%	21%
Documentation availability	46%	23%
Access to source code	42%	19%
Adherence to standards	30%	27%
Structure and quality of code	27%	28%
The programming language used	25%	44%

Note: Some respondents gave multiple "firsts".

Exhibit 3

ACCEPTABILITY OF ENABLING TECHNOLOGIES FOR IMPROVED SOFTWARE MODIFIABILITY

Technology	Acceptability (% rating 4 or 5*)
Relational DBMS	80%
Distributed data base technology	65%
Object-oriented database	60%
Object-oriented design	55%
Built with CASE tools provided with package	46%

1 = low acceptability, 5 = high acceptability

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Exhibit 4

LANGUAGE IMPORTANCE FOR MODIFICATION PURPOSES

Language	Percent of Companies
C++	30%
Cobol	19%
RPG	6%
Smalltalk	3%
C	2%
4GLs	4%
Other	4%

Exhibit A-1

COMPANIES WITH HIGH PROBABILITY OF REPLACING APPLICATIONS IN THE NEXT FIVE YEARS

	Percent of Companies at		
	50-90% Probability Level	95-100% Probability Level	Total 50-100% Probability Level
Financials	33%	28%	61%
Warehouse Mgt	28%	22%	50%
Factory Mgt	28%	20%	48%
Human Resources	24%	22%	46%
Order Processing	20%	22%	42%
MRP	17%	23%	40%
Engineering	18%	22%	40%
Procurement	19%	20%	39%

APPENDIX B

APPLICATIONS DEVELOPMENT IN THE MANUFACTURING SECTOR

I am calling from INPUT, a research and consulting firm in Teaneck, New Jersey. We are conducting a study on applications development in manufacturing. The information that you provide will be confidential and neither your name nor your company's name will be connected with any of the information in this study. In return for your assistance, we will provide you with a summary of the study's findings at no charge.

1a. Which of the following applications may be replaced in your firm in the next five years? What is the approximate probability of this occurring (for each application)? [Use table below.]

1b. What events could increase or decrease these probabilities? [For applications that may be replaced, use table below.]

1c. Is your firm considering the use of software packages or consulting services for applications that may be replaced? [Use table below.]

IF PACKAGES OR SERVICES ARE BEING CONSIDERED, GO TO 2.

Application	% Prob	Rationale for Increase/Decrease	Pkg/Svc (Y/N)
MRP	_____	_______________	_____
Order Processing	_____	_______________	_____
Warehouse Mgt	_____	_______________	_____
Factory Mgt	_____	_______________	_____
Procurement	_____	_______________	_____
Engineering	_____	_______________	_____
Financials	_____	_______________	_____
Human Resources	_____	_______________	_____

2a. What is driving the replacement?

____

____

____

2b. In evaluating software packages for the applications above, please rate the importance of the following selection criteria below, using a scale of 1 to 5, with 5 being highest importance. Please comment on your rating; for example, if the criteria apply to one application more than another.

Criteria	Rating	Comments
Extensive Built-in Features	_____	____________________
Full Installation Support	_____	____________________
Vendor-provided Product Modifications	_____	____________________
Software Modifiable by Customer	_____	____________________
Client/Server Technology	_____	____________________
Easy to integrate	_____	____________________
Hardware independent	_____	____________________
Conforms to standards	_____	____________________
Vendor reputation	_____	____________________
Other		
____________	_____	____________________
____________	_____	____________________

3. In performing modifications, there are six elements involved:

	Rank
• Access to source code	
• The programming language used	
• Structure and quality of code	
• Adherence to standards	
• The documentation available	
• Access to knowledgeable technical staff	

Please rank the importance of these elements (from one to six, with one being the most important) and explain your reasoning. In the case of languages, which language (or languages) is preferred?

Explanation

4. I would like to look at the issues involved with software modification in more depth. For your company, by 1995 how acceptable is each of the following enabling technologies, assuming that it was built into an application (1 = low acceptability, 5 = high acceptability)? Please give the reason for your rating.

Technology	Rating	Reasons
Object-oriented design	______	____________________________
Object-Oriented database	______	____________________________
Built with CASE tools provided with package	______	____________________________
Distributed data base technology	______	____________________________
Relational DBMS	______	____________________________
Written in C++	______	____________________________
Written in Smalltalk	______	____________________________
Written in another language (________)	______	____________________________
Other (________)	______	____________________________

5. If the designers of a packaged software application asked your advice on the critical issues involving the next generation of software, what advice would you give?

____

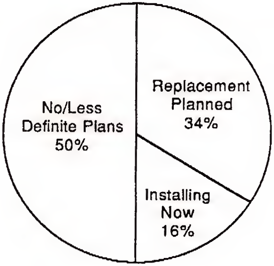
____

____

THANK YOU FOR YOUR PARTICIPATION.

YNSW2 Exhibit 13

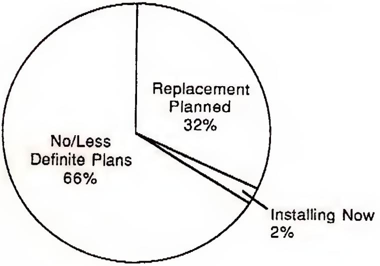
Replacement Status for Priority Applications Medium-Sized Drug and Chemical Companies (Targeted Manufacturing Applications)



N = 68

YNSW2 Exhibit 14

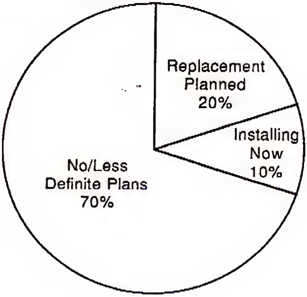
Replacement Status for Priority Applications Large Drug and Chemical Companies (Targeted Manufacturing Applications)



N = 56

YNSW2 Exhibit 18

Replacement Status for Priority Applications Resource Planning

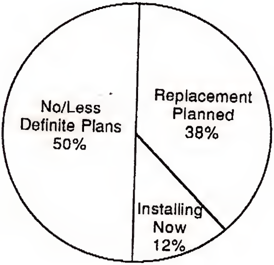


N = 10

Note: Small sample

YNSW2 Exhibit 16

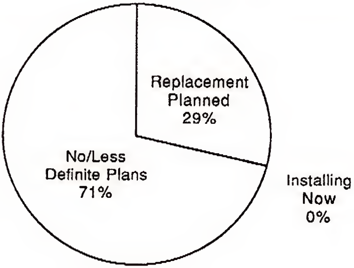
Replacement Status for Priority Applications Environmental



N = 16

YNSW2 Exhibit 17

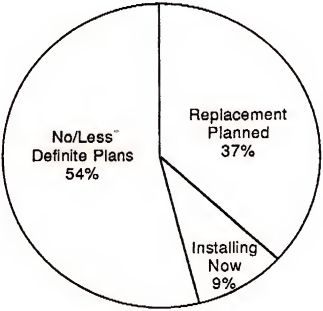
Replacement Status for Priority Applications Product Management



N = 17

YNSW2 Exhibit 21

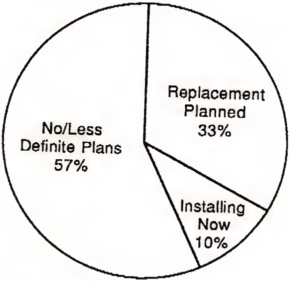
Replacement Status for Priority Applications
All Applications



N = 191

YNSW2 Exhibit 20

Replacement Status for Priority Applications Targeted Manufacturing Applications

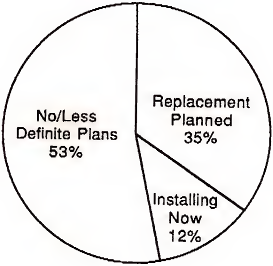


N = 124

Note: Omits financial and "other" applications

YNSW2 Exhibit 15

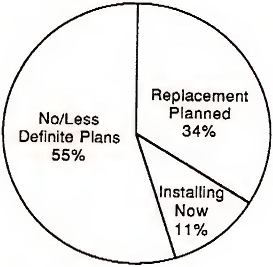
Replacement Status for Priority Applications
Plant Operations



N = 43

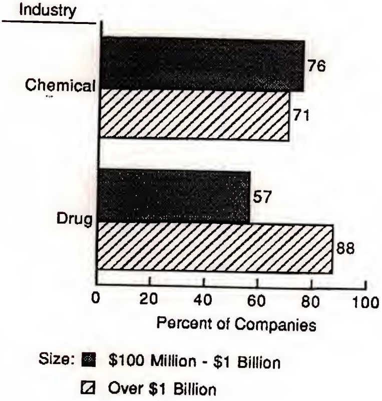
YNSW2 Exhibit 19

Replacement Status for Priority Applications Customer Service



N = 38

Percent of Companies with Increased Rate of Application Change/Replacement in Last Five Years

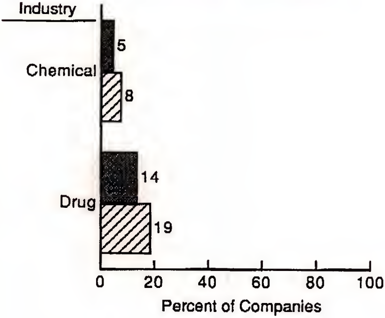


Unweighted average: 73%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 3

Percent of Companies Citing Distribution as a Priority Application



Size: ▩ $100 Million - $1 Billion

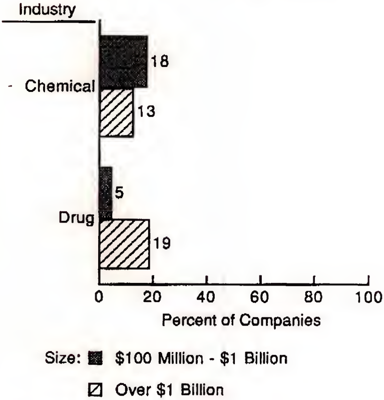
▨ Over $1 Billion

Unweighted average: 12%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 5

Percent of Companies Citing Order Entry as a Priority Application

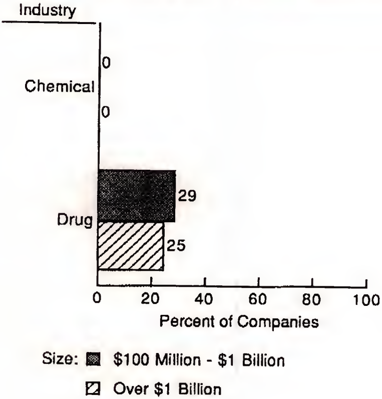


Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 4

Percent of Companies Citing Sales and Marketing as a Priority Application

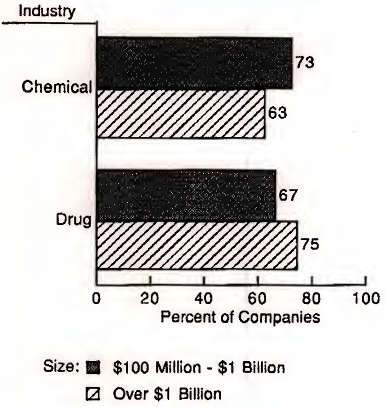


Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 1

Percent of Companies Citing Plant Operations as a Priority Application

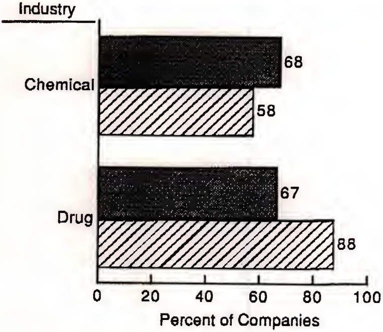


Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 9

Percent of Companies Citing Customer Service as a Priority Application



Size: ■ $100 Million - $1 Billion

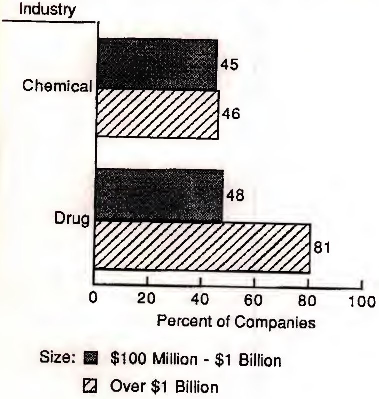
▨ Over $1 Billion

Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 7

Percent of Companies Citing Product Management as a Priority Application

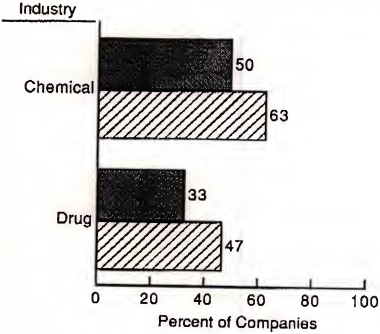


Unweighted average: 55%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 10

Percent of Companies Citing Environmental, Health, Safety, and Training as a Priority Application



Size: ■ $100 Million - $1 Billion

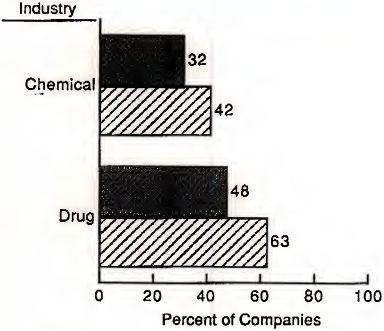
▨ Over $1 Billion

Unweighted average: 48%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 8

Percent of Companies Citing Resource Planning as a Priority Application



Size: ■ $100 Million - $1 Billion

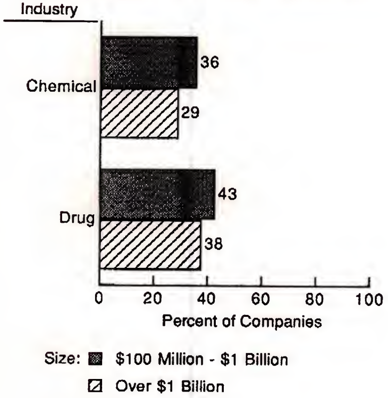
▨ Over $1 Billion

Unweighted average: 46%

Source: Surveys of 83 chemical and drug companies/divisions

YNSW2 Exhibit 6

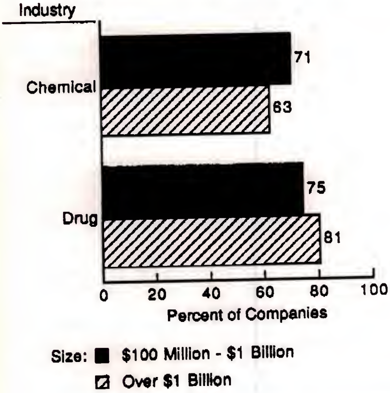
Percent of Companies Citing Financial Systems as a Priority Application



Unweighted average: 37%

Source: Surveys of 83 chemical and drug companies/divisions

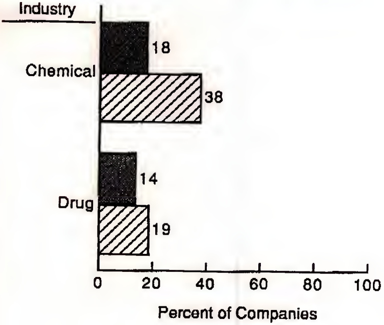
Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software



Source: Surveys of 83 chemical and drug companies/divisions.
"Primary" = 50% or more.

YNSW2 Exhibit 2

Percent of Companies Citing Other Systems as a Priority Application



Size: ■ $100 Million - $1 Billion

▨ Over $1 Billion

Unweighted average: 22%

Source: Surveys of 83 chemical and drug companies/divisions

INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 • Tel. (201) 801-0050
Fax (201) 801-0441 • VM (415) 961-3193 Ext. 302

THOMAS J. O'FLAHERTY
Vice President

YNS462/3

Tom —

Here is the first "reissue". Others to follow soon

Tom

Report

PACKAGED SOFTWARE PLANS IN SELECTED PROCESS MANUFACTURING SECTORS

Revised January 29, 1993

Prepared for:

Andersen Consulting

Prepared by:

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

INPUT

PACKAGED SOFTWARE PLANS IN SELECTED PROCESS MANUFACTURING SECTORS

I. EXECUTIVE SUMMARY

A. Background

This report summarizes several studies which have examined the market for packaged applications software in the process manufacturing sector.

Much of the material and conclusions are based on primary interview research which INPUT conducted between July and November 1992. During that period INPUT interviewed 114 companies in the food, drug and chemical industries. The analysis contains information from 278 mission-critical applications in those companies.

This summary covers the following topics:

- Overall market size and segmentation
- Buyers values, covering applications, technology and the role of the end user.
- Competitive environment

B. Market Size and Segmentation

This market is not a uniform market. The market varies appreciably in terms of

- The average expenditure per application (from $250,000 in medium-sized chemical companies to $3 million per application in large drug companies)
- The average number of high priority applications per company (from around three per company in most medium-sized companies to five in the larger food and drug companies).
- The number of potential customers (i.e, about 15 large drug companies and about 1,000 medium-sized food processing establishments)

Over the next three years, INPUT estimates that approximately $1 billion will be spent on packaged software in these three target industries (Exhibit I-1).

- These figures are limited, to the extent possible, manufacturing applications within these companies. (Note: These figures exclude hardware expenditures.)
- As Exhibit I-1 shows, about half this figure is in the smaller food processors: This is largely a function of the number of such establishments. The other segments are roughly the same size from a potential revenue standpoint.
- This money may not all be spent; much depends on whether applications meet constantly evolving user needs.

C. Buyer Values

1. Application Focus

Applications with a high degree of "manufacturing" content are those with the highest planned replacement rates. Across the segments measured, there was a fairly constant planned replacement rate of 30% to 40%. The principal applications are the following:

- Plant operations
- Environmental, health and safety
- Customer service
- Resource planning
- Product management

Financial and accounting products are often associated with one or more of the above in the replacement process; however, it is generally the manufacturing applications which drive replacement.

A substantial majority of companies are planning to use software packages as their replacement vehicle.

- Almost 80% of companies interviewed saw a 75% or greater probability of using a software package as their new application.
- Two-thirds of the companies that were less certain of their use of packages would be more likely to use a package if the package was flexible and tailorable.
- The replacement rate compares to a current market share of around 50% for software products (the rest is made up of custom application built in-house or by a vendor).

2. Technology and Other Selection Factors

Technology features (such as client/server) are important to a majority of companies. However, functional issues are even more important, such as ease of integration, standards and built-n features (see Exhibit I-2).

Based on this, and other, research INPUT expects "pure" technology to be less of an attraction as application control shifts even further into end user hands.

Even among technologists, the application benefits of technologies like client/server or object-oriented design are not yet clear

- This uncertainty is partly a question of customers not being fully current on leading edge technology issues.
- Even where customers are informed, there is doubt over whether the actuality of technology will live up to the promises. Many enthusiasts have been sobered by the performance of CASE, for example.

Technology-based solutions will have to demonstrate their effectiveness.

3. The End User Role

One of the most important long term issues is the increased importance of the end user departments in the application selection process.

- Exhibit I-3 shows that in even smaller food processors that the end users have primary decision making in half the companies.
- This percent increases to 70%-80% in the larger companies.
- This trend is expected to continue by all involved.

The involvement of end users has several implications:

- Obviously, the sales process no longer stops at the IS department. (Sometimes it may not even include IS.)
- The process itself will often be different. Functional units are less interested in formal short lists and, even where objective selection criteria exist, they may not be followed.
- More subtilely, end users will be looking for different things from software products (and their vendors). INPUT research in other areas has shown, for example, that application product vendors are valued for their perceived ability to produce a solution, rather than individual characteristics of the package.

D. Competitive Environment

SAP is commonly viewed as the leading vendor in this area (Exhibit I-4). This is undoubtedly true, from the standpoint of SAP's market share among large companies. However, midrange vendors such as J.D.Edwards are quite strong in smaller companies and divisions of large companies.

However, no vendor has a lock on the future market:

- SAP has to prove itself outside of the MVS market.
- All vendors have to prove themselves in a true client/server setting.
- The AS/400 has proved to be a very desirable platform for several firms (Such as J.D. Edwards). However, the AS/400 may prove to be less desirable as an entry into distributed or cooperative applications. At the very least, the turmoil that IBM is going through may produce problems for AS/400 applications developers for reasons outside their control.

Exhibit I-1

Estimated Expenditures per Segment on Packaged Software for Priority Manufacturing Applications: 1993-1995

Industry	Medium Companies ($100-$999 MM)	Large Companies (Over $1 Billion)	Total ($MM)
Drug	110	60	170
Food	500	130	630
Chemical	100	110	210
Total	710	300	1,010

Exhibit I-2

IMPORTANCE OF SOFTWARE PACKAGE EVALUATION CRITERIA

Criteria	Importance (% Respondents Rating 4 or 5*)
Easy to integrate	88%
Conforms to standards	77%
Extensive Built-in Features	76%
Vendor reputation	74%
Full Installation Support	69%
Client/Server Technology	68%
Software Modifiable by Customer	62%
Hardware Independent	56%
Vendor-provided Product Modifications	52%

*1 = lowest importance, 5 = highest importance

Exhibit I-3

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

	Company Size*	
Industry	Medium	Large
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit I-4

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

II. BACKGROUND AND METHODOLOGY

A. Background

This report is a summary of research conducted for Andersen Consulting in July-December 1992.

- In July 1992 INPUT conducted research to understand software purchase rate profiles among potential customers. Two sectors were selected: utilities and food processors. The questionnaire used is in Appendix A.
- This information, along with other information on "Best Bet" software product opportunities and market entry build-up analyses, was reviewed at a worksession in Chicago on August 13, 1992. This material was later summarized in a written report in September 1992.
- This report has extracted material from the August and September analyses on food processor purchasing plans.

As a follow-on to the July/August research, INPUT conducted additional, expanded research in the chemical and drug industries in October and November 1992.

- This additional research went into more detail on specific applications plans. The questionnaire used is in Appendix B.
- The results from this research were reported to Andersen in a draft written report dated November 16, 1992.

This report below combines the material from the November report as well as appropriate material on the food processing sector from the earlier work.

The food processing data is comparable at the industry segment level

At the application level INPUT makes observations in this report on the extent to which the food processing industry's profile is similar to those of the drug and chemical sectors.)

B. Methodology

The material reported on here was obtained from telephone interviews conducted with 114 companies. The distribution of interviews is shown in Exhibit I-1.

- Respondents were those knowledgeable concerning the applications plans and directions of their company.
    - Usually, the respondents were connected with the central IS department, even though the responsibility for applications planning and/or implementation was often located elsewhere.
    - INPUT has found -- in this and other studies -- that the central IS organization is still a good place to obtain corporate-wide information, even if IS is not fully informed on all details.
- Companies were further divided into "medium" and "large" entities ("medium being revenues between $100 and $999 million). Where divisions of large entities operate independently, they were classified as "medium" for the purposes of this analysis.

Within each company INPUT focused on mission-critical applications: for the drug and chemical industries, these were primarily targeted from a specific list agreed to by INPUT and Andersen prior to the survey; for the food processing sector, the respondents selected applications without prompting. The data contains information on 278 mission-critical applications.

In general, INPUT found the respondents were open and forthcoming concerning their companies' plans. In some cases, as noted above, the respondent was not fully informed concerning decentralized applications plans; however, the decentralized units in this sort of situation are often no more able to precisely define their future plans.

Exhibit II-1

Interview Distribution

	Company Size		
Industry	Medium	Large	Total
Chemical	22	24	46
Drug	21	16	37
Food Processing	13	18	31
Total	56	58	114

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

III. FUTURE APPLICATIONS

This section reports on:

- The planned rate of applications replacement
- The extent of software package usage (versus custom development, whether performed in-house or by a vendor)

A. Replacement Plans

Respondents have seen an increased rate of applications change in the last five years (Exhibit II-1). Large drug companies have seen the largest amount of change.

An analysis of priority applications shows that over one-third are expected to be replaced in the next five years (Exhibit II-2). An additional tenth are currently in the process of being replaced.

This picture is virtually unchanged when the secondary applications (financial and other) are excluded (Exhibit II-3). This replacement rate is very similar across all manufacturing-oriented applications.

B. Package Usage

Currently, packages are used in about 40% of priority applications (Exhibit II-4). Drug companies are more likely to use packages now.

A striking finding is that where a replacement is currently planned, over three-quarters of drug and chemical companies see a high probability of using a package (Exhibit II-5). [Study data is not exactly comparable for food processors. However, their software product replacement rates should be similar, given overall trends (Exhibit II-6).]

Another important finding is that where companies are less likely to use a package, the probability of use increases markedly if the package were "more flexible and tailorable than the current generation of software packages." (Exhibit II-7). Potentially, almost all new applications could use packages as a base.

Exhibit III-1

Percent of Companies with Increased Rate of Application Change/Replacement in Last Five Years

	Company Size*	
Industry	Medium	Large
Chemical	76	71
Drug	57	88
Food Processing	54	72

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit III-2

Replacement Status for Priority Applications
All Applications

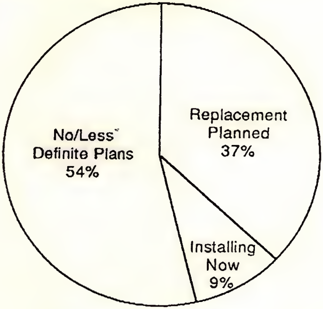
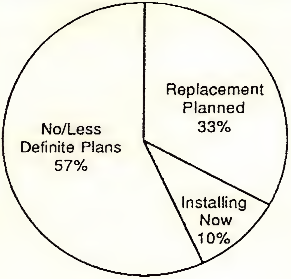


Exhibit III-3

Replacement Status for Priority Applications Targeted Manufacturing Applications



N = 124

Note: Omits financial and "other" applications

Exhibit III-4

CURRENT PACKAGE USE IN TARGETTED APPLICATIONS

All Firms	40%
Chemical Companies	32%
Drug Companies	52%
Food Processing Companies	38%

Exhibit III-5

Probability of Using Software Package for Planned Replacement Manufacturing Applications in the Drug and Chemical Sectors *

Probability of Using Package	% of Applications
75% or greater	78%
25-50%	10%
0 or don't know	12%
	100%

*Excluding Financial and "Other"

Exhibit III-6

Switching From Custom To Packaged Software Is Common In The Food Processing Industry

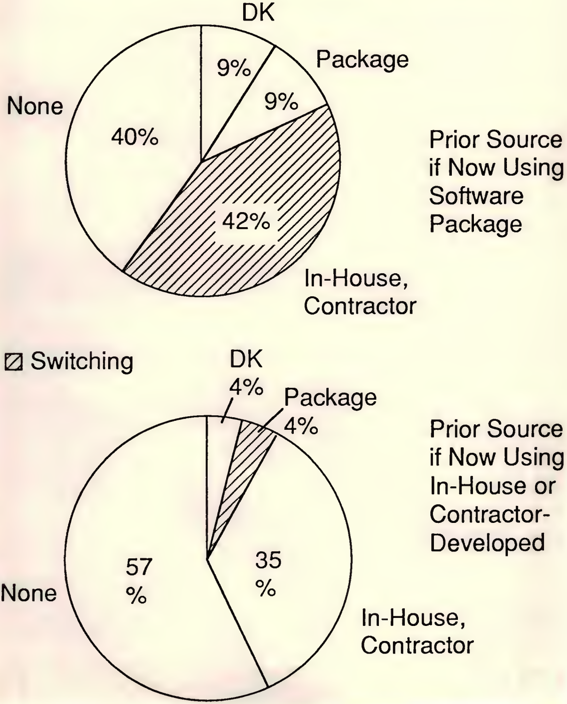


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Exhibit III-7

Impact of Flexibility/Tailoring on Increasing Probability of Using Packaged Software

Probability of using package for planned replacement	Number of Cases	Number more likely to use package
75%	5	3 (60%)
25%-50%	4	3 (75%)
0/Don't know	5	3 (60%)
Total	14	9 (64%)

Source: Drug & Chemical Companies

IV. APPLICATION SELECTION MOTIVATORS

In the research performed for this study INPUT found that there were two distinct motivators changing application selection practices:

- Increasing end user involvement in applications in general, especially in the selection process
- Changes in technology

A. End User Involvement

As shown in Exhibit III-1, end users already have primary decision making authority over applications generally in most companies. This tends to be higher in the larger companies; this is not surprising, because the operating units are larger and can be more self-sufficient. The end user role, as perceived by the IS department is still increasing on the whole (Exhibit III-2). This perception is especially important since many IS units' interests would be better served if the opposite were the case.

These figures are even more impressive when specific applications are examined (Exhibit III-3).

- The split between large and medium sized firms is striking.
- This indicates that users are taking control of the most important applications first, leaving the less important and/or "maintenance" work to IS.

B. Impact of Technology Changes

About half of the companies say that technology changes are accelerating general applications replacement. This factor is somewhat more important in the larger companies (Exhibit III-4). Based on other work which INPUT has conducted, these are generally feelings influenced by downsizing in general.

However, when questioned on the importance of incorporating new technologies into specific applications, the response was lukewarm at best (Exhibit III-5). Even client/server and cooperative processing received a relatively low response. (The apparently higher ratings for environmental and resource planning is probably a result of small sample sizes.)

INPUT believes that these ratings are low because:

- Many respondents are not very well informed on the quickly-changing technology issues involved.
- Even when respondents are reasonably well informed on technology issues they will have difficulty relating the technology to changes in a specific application.

INPUT expects this problem to become more acute as user departments assume more influence and as vendors begin making more technology claims.

Exhibit IV-1

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

	Company Size*	
Industry	Medium	Large
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit IV-2

Role of Users Is Increasing (As Perceived by IS)

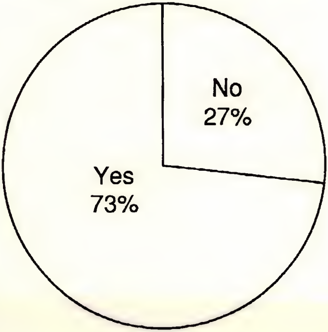


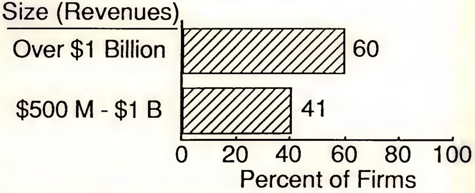
Exhibit IV-3

Percent of Time User Department is Main Decision Maker for Specific Applications in the Chemical and Drug Sectors

	Size of Company	
Application	Medium	Large
Plant Operations	27%	75%
Environment/Health	67%	100%
Customer Service	32%	64%
Resource Planning	40%	100%
Product Management	33%	75%
Industry (as a group)		
Chemical	30%	82%
Drug	50%	71%
All (Not weighted)	40%	78%

Exhibit IV-4

Technology Change Accelerating Applications Replacement



Source: Interviews with 67 IS departments INPUT

SP-228

Exhibit IV-5

Importance of Incorporating Technologies into Manufacturing Applications

Technology	Plant Op	Env	Cust Serv	Res Plan	Prod Mgt	Avg. *
Client Server	3.1	3.8	3.4	3.7	3.1	3.3
Embedded CASE	2.6	2.4	2.6	2.3	2.6	2.6
Objected-Oriented	2.4	2.4	2.6	2.9	2.6	2.6
AI	2.3	2.3	2.3	1.7	2.1	2.2
Cooperative Processing	3.1	3.1	3.1	2.3	3.1	3.0
Number of Interviews	41	14	37	9	15	

* Not weighted; 1 = Not important 5 = Very Important

V. APPLICATION PRIORITIES IN MANUFACTURING

For the chemical and drug sectors INPUT prepared a list of applications for which respondents rated the importance ("Principal Focus" group in Exhibit IV-1). In addition, many respondents volunteered other applications ("Secondary Focus" group in Exhibit IV-1).

Two applications stood out as being of primary importance: customer service and plant operations, being cited by over two-thirds of respondents (Exhibit IV-2, "Priority Group A").

A second group of applications was seen as important by about half of respondents: product management, environmental/health and resource planning (Exhibit IV-3, "Priority Group B")

The third group ("Priority Group C" in Exhibit IV-4) is made up of the more important applications that were volunteered. These include financial systems, distribution/logistics and order entry. INPUT believes that these applications would probably be rated somewhat higher if all respondents had been asked to specifically rate them:

- A few applications may have been overlooked by respondents when they were volunteering priorities.
- Other applications may have been viewed by respondents as being integral to principal applications (e.g., financial or distribution/logistics as part of plant operations).

Sales and marketing applications are important for drug companies and not important to chemical companies (Exhibit IV-5). INPUT believes the profile for food processors would be similar to drug companies, especially in the importance of sales and marketing applications.

Large drug companies cited an average of 4.8 priority applications per company. Other classes of companies averaged about 3.5 applications per company.

As cited in Chapter III, replacements are planned for over one-third of priority applications overall. This percentage does not vary substantially for individual applications.

Exhibit V-1

Application Focus

Principal Focus

Plant operations
Environmental, health and safety
Customer service
Resource planning
Product management

Secondary Focus

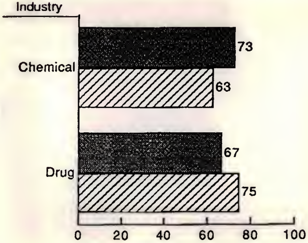
Financial/accounting
Order entry
Distribution
Sales and marketing
Other (e.g., Bar coding, EDI, imaging, maintenance, POS)

Note:

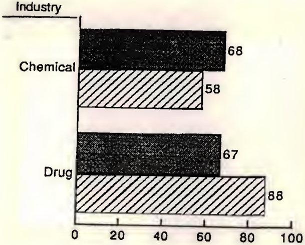
- Respondents specifically questioned on status of "principal" applications.
- "Secondary" application status was volunteered

EXHIBIT V-2

PRIORITY GROUP A: CUSTOMER SERVICES AND PLANT OPERATIONS



PERCENT OF COMPANIES
CITING PLANT OPERATIONS
AS A PRIORITY APPLICATION



PERCENT OF COMPANIES
CITING CUSTOMER SERVICE
AS A PRIORITY APPLICATION

Size: ▩ $100 Million - $1 Billion

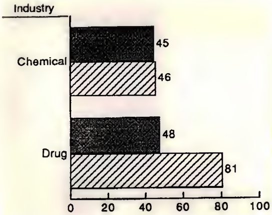
▨ Over $1 Billion

Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

EXHIBIT V-3

PRIORITY GROUP B: PRODUCT MANAGEMENT, ENVIRONMENTAL/HEALTH, AND RESOURCE PLANNING

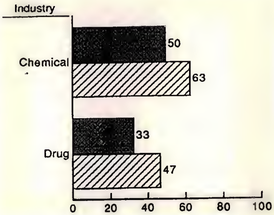


PERCENT OF COMPANIES CITING PRODUCT MANAGEMENT AS A PRIORITY APPLICATION

Size: ▪ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 55%

Source: Surveys of 83 chemical and drug companies/divisions

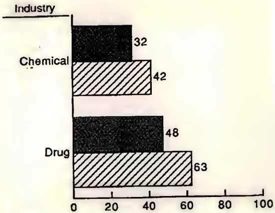


PERCENT OF COMPANIES CITING ENVIRONMENTAL, HEALTH, SAFETY, AND TRAINING AS A PRIORITY APPLICATION

Size: ▪ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 48%

Source: Surveys of 83 chemical and drug companies/divisions



PERCENT OF COMPANIES CITING RESOURCE PLANNING AS A PRIORITY APPLICATION

Size: ▪ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 46%

Source: Surveys of 83 chemical and drug companies/divisions

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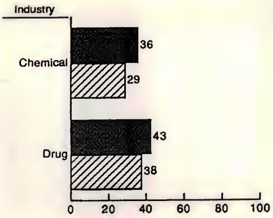
EXHIBIT V-4

PRIORITY GROUP C: FINANCIAL SYSTEMS, DISTRIBUTION/LOGISTICS, AND ORDER ENTRY

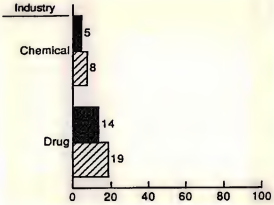


PERCENT OF COMPANIES VOLUNTEERING FINNCIAL SYSTEMS AS A PRIORITY APPLICATION

Size: ■ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 37%

Source: Surveys of 83 chemical and drug companies/divisions

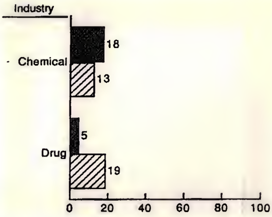


PERCENT OF COMPANIES VOLUNTEERING DISTRIBUTION/ LOGISTICS AS A PRIORITY APPLICATION

Size: ■ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 12%

Source: Surveys of 83 chemical and drug companies/divisions



PERCENT OF COMPANIES VOLUNTEERING ORDER ENTRY AS A PRIORITY APPLICATION

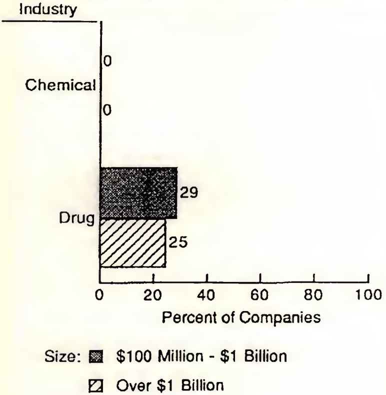
Size: ■ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

Exhibit V-5

Percent of Companies Citing Sales and Marketing as a Priority Application



Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

VI. SOFTWARE PRODUCT EXPENDITURES

A. Spending by Type of Application

Drug and chemical respondents were asked to estimate the amount that they thought would be invested in software and people costs for particular priority applications over the next five years. Exhibit V-1 shows average spending per application.

- Not surprisingly, large companies are expecting to spend more than medium-sized companies for each application.
- Drug companies plan higher rates of spending per application than chemical companies.

Exhibit V-2 shows spending by application (across chemical and drug companies). Customer service and product management are shown to be the applications with the most spending planned. INPUT expects that food processing companies would have profiles similar to drug companies.

Several cautions should be provided on this data:

- Respondents were generally forthcoming, but often did not know all planned spending (either because they were not totally in the knowledge loop or, more often, because spending plans were part of larger departmental plans that were evolving).
- Figures are order of magnitude and usually ranges.
- While five year figures were requested, INPUT believes that in most cases these figures represent spending over the next 2-3 years.

The net result of these factors is that the figures in Exhibits V-1 and V-2 may be conservative.

B. Market Size Estimates

Exhibit VI-3 takes the average number of priority applications times the average spending per applications to produce an average expenditure per company on priority applications for each segment.

Exhibit VI-4 adjusts the average expenditure per company to average packaged software spending per company and multiplies this by the number of companies in each segment. This produces a market size per segment over the 1992-1995 period.

- As noted above, this figure may be conservative, since not all spending plans could be identified in the research.
- This is balanced by the very real possibility that not all the planned spending may take place: The packaged applications have to be useful ones that meet user needs. In many cases those requiring a new application have not yet come up against the deficiencies of current products in the marketplace.

Exhibit VI-1

Average Spending on Drug and Chemical Applications by Company Size

Application	Size of Company Medium	 Large
Plant Operations	$250K	$1 million
Environment & Safety	$250K+	$750K+
Customer Service	$1 million+	$3 million+
Product Management	$500K+	$750K

- Excludes resource planning (insufficient data)
- Based on estimates for 48 applications

Exhibit VI-2

Average Spending per Application By Industry and Company Size

	Size of Company	
Industry	Medium	Large
Chemical	\$250K	\$750K
Drug	\$1 million +	\$3 million +

- Includes plant operations, environment and safety, customer service resource planning, product management
- Based on estimates for 53 applications

EXHIBIT VI-3

AVERAGE EXPENDITURES PER SEGMENT ON PRIORITY APPLICATIONS

	MEDIUM COMPANIES			LARGE COMPANIES		
INDUSTRY	AVERAGE # OF PRIORITY APPLICATIONS X	AVERAGE SPENDING PER APPL. ($MM) =	AVERAGE EXPENDITURE PER CO. ($MM)	AVERAGE # OF PRIORITY APPLICATIONS X	AVERAGE SPENDING PER APPL. ($MM) =	AVERAGE EXPENDITURE PER CO. ($MM)
DRUG	4	1.0	4.0	5	3.0	15
FOOD	3	.75	2.25	5	2.0	10
CHEMICAL	3	.25	.75	4	.75	3

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EXHIBIT VI-4

EXPENDITURES BY SEGMENT ON PACKAGED SOFTWARE FOR PRIORITY APPLICATIONS: 1993-1995

	MEDIUM COMPANIES			LARGE COMPANIES			
INDUSTRY	AVERAGE SPENDING/CO. ON APPLIC. PKGS ($MM)* x	NUMBER OF COMPANIES** =	APPLICATION PACKAGE EXPENSE ($MM)	AVERAGE SPENDING/CO. ON APPLIC. PKGS. ($MM)* x	NUMBER OF COMPANIES =	APPLICATION PACKAGE EXPENSE ($MM)	TOTAL
DRUG	.75	150	110	3.75	15	60	170
FOOD	.50	1000	500	3.75	35	130	630
CHEMICAL	.20	500	100	3	35	110	210
TOTAL			$710			$300	$1010

* 75% OF TOTAL APPLICATION SPENDING

** ESTABLISHMENTS - INPUT ESTIMATE FROM DEPT. OF COMMERCE DATA

VII. COMPETITIVE ENVIRONMENT

A. Overview

SAP is the current leader in terms of functionality, market share and "mind share". In addition to Andersen, there are four other primary competitors (Exhibit VII-1) as well as several secondary competitors and EDS and Oracle who are potential primary competitors.

However, even SAP does not have a lock on the market: With an MVS product, it is limited to the large scale system, generally inside large companies. Arguably, the delay in r/3 and consequent lost momentum have stopped SAP from becoming the market leader.

- J.D. Edwards is very well placed in the midrange market and from a functionality standpoint comes close to what SAP offers.
- No firm now offers what could be termed true distributed or cooperative processing. Edwards, for example, calls its product "client/server", even though it is on the AS/400 platform.

INPUT believes that this market is in fact quite open to products vendors with these characteristics:

- Provided by a vendor large enough to weather one bad mistake (Datalogix probably could not for example).
- Offered on a client/server architecture (arguably all but possibly Oracle and Ingres would fail this test)
- Committed to the process market (IBM, D & B, SSA, EDS and Oracle are doubtful by this measure)

The following sections assess the strengths and weaknesses of the major vendors as well as an assessment on their futures. (The vendors are listed alphabetically.)

B. ASK

Strengths

- Historic strong position in discrete manufacturing
- Ingres allows tailoring of functions for process applications
- Runs on multiple midrange platforms
- Have made modifications from discrete MRP for process budgeting, forecasting and tracking
- Ingres could serve as long term means of adding client/server functions to applications

Weaknesses

- Ingres commitment probably more of a distraction than a net contributor: An alliance could have produced most or all of benefits (example: NCR and DBMS companies)
- Older technology overall
- Company does not have a great deal of process knowledge and no easy means of getting it (unlike Oracle, with an in-house consulting arm)
- So far, the process components are viewed as add-ons

Futures

- Ingres' strategic commitment is to manufacturing market: It must expand into process
- Similarly, its Ingres investment has to migrate to new technologies.
- This combination means that ASK will remain as a strong, but secondary, competitor

C. Datalogix

Strengths

- A process manufacturing software specialist
- Long-established on various traditional midrange platforms (CIMPRO)
- Recently began offering GEMMS on various UNIX platforms -- objective is a product that runs on multiple hardware platforms in multiple plants. Still in beta.
- Good front end for chemical, energy; adds value in formula management

Weaknesses

- GEMMS still an unknown.
- UNIX platform may prove limiting, especially considering position of AS/400 (which has not been seriously affected so far by UNIX platforms)
- As a fairly small company ($20MM), it cannot afford a product failure.

Futures

- Must remain a competitor (or go out of business)
- Unlikely that UNIX offering can threaten SAP

D. D & B Software

Strengths

- Installed customer base

Weaknesses

- Mainframe orientation; very slow and unsuccessful efforts to break out
- Process offerings offer a limited set of functions based on discrete products
- Overlapping product lines generally from past acquisitions only now being sorted out. Produces confusion among customers and among developers.
- General financial applications and, next, discrete applications take precedence
- Client/server "strategy" depends on third party enabling products and a complex transition strategy: Many things can go wrong

Futures

- Unlikely to be a serious competitor for the foreseeable future

E. J.D. Edwards

Strengths

- Similar functionality to SAP
- Offers full set of financial and discrete functionality
- Large enough company to support full application range
- Even though products run on an AS/400 platform, marketed as a "client/server" product

Weaknesses

- AS/400 platform is both a strength and a weakness: Could lose popularity for reasons outside of Edwards' control.

Futures

- An excellent combination of a specialist that has reached critical mass from a size and market standpoint.
- Is well-positioned to take on r/3.

F. EDS

Strengths

- Very aggressively building its manufacturing presence:
    - McDonnell-Douglas acquisition
    - Investments/alliances with ASK, Consilium, Sherpa
- Resources, people

Weaknesses

- Little activity so far in process software
- In general, EDS has not been successful in software products; services are far more likely to gain support internally
- Alliances are a two-edged sword

Futures

- Will probably not become a major software product competitor

G. IBM

Strengths

- Renewed emphasis on industry orientation at local levels
- Closer linkage between software products, services and other offerings in Trading Area organization
- Increased range of manufacturing software offerings (CIM/400 as general manufacturing product; POMS; PRISM - co-marketed with Marcam)

Weaknesses

- Many opportunities for product and marketing conflicts
    - No longer strong central industry management
    - Trading Areas may not have critical mass to support industry niches
- Product focus is fuzzy, especially between IBM products and partner products

Futures

- Very unclear

H. Marcam

Strengths

- Process software specialist
- PRISM is an established AS/400 product; recently expanded to MS-DOS
- Also agent/consultant for MAPICS
- Good critical mass ($60MM)

Weaknesses

- As with J.D. Edwards, being tied to AS/400 is a strength and a weakness.

Futures

- Will remain a viable competitor, but is unlikely to overtake J.D. Edwards

I. Oracle

Strengths

- Enormous installed base; customers reasonably well-disposed toward Oracle
- Applications in general have become a priority, as part of a reasonable strategy.
- Oracle's evolving architecture is heading in the right direction.
- Excellent sales organization generally; learning about applications.
- New UNIX/MS-DOS products
- Application feedback from consulting organization

Weaknesses

- Process is not a priority now.
- Probably still behind the knowledge curve

Futures

- Oracle will keep up with technology.
- Will Oracle be able to accelerate its knowledge of process applications?
- Is unlikely to be a major process competitor in the medium term

J. Ross Systems

Strengths

- Promix acquisition
- Strength in food industry

Weaknesses

- Older system, written in odd language (Gembase)
- An add-on product, not integrated with other offerings

Futures

- Unclear if acquisition was opportunistic or strategic.
- A narrow base to assault the process market.
- Unlikely to be a major competitor

K. SAP

Strengths

- Dominant position in large companies (both market share and "mindshare")
- Includes all components: Planning, shop floor, accounting, distribution. (Only J.D. Edwards is currently competitive.)
- Beginning to build niche function libraries (e.g., has over 100 functions aimed at oil industry). ABAP 4GL helps address end users from a functional standpoint (developed in C++).
- r/3 can be configured to look like client/server (as an X-window terminal) -- presentation, DBMS and applications modules.

Weaknesses

- Transition from r/2 to r/3 has been slow.
- Unclear if recent management shakeup will affect growth and ability to support clients.

Futures

- Is the benchmark in process software.
- r/3 is now UNIX and Sun-oriented. Windows/OS/2 is next.
- HP, DEC (Alpha), RS6000 on horizon

L. System Software Associates

Strengths

- Discrete core of capabilities

Weaknesses

- Limited process functionality
- AS/400 is strength and weaknesses

Futures

- Unlikely to be a major player

Exhibit VII-1

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

Appendix A

MISSION CRITICAL APPLICATIONS STUDY

My name is ____________________. I'm with INPUT, a research and consulting firm in Teaneck, New Jersey. We are conducting a study on why and on what cycle companies replace their mission-critical applications. All the information you provide will be kept confidential, as well as your name and your company's name. In return for your assistance, we will send you a summary of the completed study at no charge.

1a. First of all, what are your five most important applications today? (in order of importance).

1b. How will this list change in five years, either in terms of their order on the list, or by the adding of new applications?

	1992	1997
1.	______________________	______________________
2.	______________________	______________________
3.	______________________	______________________
4.	______________________	______________________
5.	______________________	______________________

1c. What are the reasons for these changes?

2. Next, I would like to understand more about four of these applications. **[Select as follows: If there were applications added to the 1997 list, take the top two additions, plus the two most important from 1992; if only one was added, take that, plus the top three for 1992; otherwise, the top four in 1992]**

Use one of the attached "Applications Sheets", for each application

____________________ APPLICATION

A. What is the source of this application?

In-house developed ________

Custom developed by a contractor ________

A commercial software package ________
(Name - ________________)

Other (e.g., combination of above, developed by parent company) [describe]

B. Why was this source chosen?

C. What other sources were considered?

D. What year was it installed?

E. What was the time to implement? (From completion of requirements to successful use?)

F. Approximately how much were the implementation costs? (Including design, testing, installation, software licences, but excluding hardware)? [Can prompt with following]

Under $100,000	______	$1-5 M	______
$100K - 500K	______	$5 - 10 M	______
$500K - $1 M	______	Over $10 M	______

G. What were the three most important reasons for installing this application? (What were the underlying business reasons?)

1. ____

2. ____

3. ____

G1. Was it part of a Quality Initiative? Yes _____ No _____

H. On a scale of 1 to 5 (with 5 being highest), how well were initial expectations for this application met? ________

Why?

I. Since installation, when have there been significant changes to the application, why were they made, and about how much did they cost?

Change/Reason	Year	Cost
____	_____	_____
____	_____	_____
____	_____	_____

J. If a software package is used, is it now under a maintenance contract?

Yes _____ No _____

Why?

K. Looking back in time, did this application replace a similar application?

Yes _____ No _____ If yes,

What was the source?

What year was this prior application installed?

Why was the application replaced?

L. Looking ahead, what significant changes, (including replacement), do you expect to make (and why), when do you expect to make them, and what do you expect the order of magnitude costs will be?

Change/Reason	Year	Cost
____	_____	_____
____	_____	_____
____	_____	_____

M. When do you expect to or want to replace the application?

3. Now I would like to ask some more general questions.

   A. Are changes and replacements cycles occurring at a different rate now, compared to say, five years ago? (e.g., percent change, reasons)

   B. What is the role of end users in producing changes to applications now as opposed to five years ago?

   C. What would you say is the split of decision making authority between IS management and users regarding the decision to replace or change application software?

   D. What impact do you see technology having on producing change in applications? (e.g., which ones, on which applications, how important, when)

   E Would technology changes, such as client/server, workstation functionality, or graphic user interface, accelerate replacement of an application independent of business process re-engineering?

4. Do you have any other comments on mission-critical applications in your organization or generally?

Appendix B

APPLICATIONS DEVELOPMENT IN THE MANUFACTURING SECTOR

I am calling from INPUT,
a research and consulting firm in Teaneck, New Jersey. We are conducting a study on applications development in manufacturing. The information that you provide will be confidential and neither your name nor your company's name will be connected with any of the information in this study. In return for your assistance, we will provide you with a summary of the study's findings at no charge.

1a. Which of the following applications may be replaced in your firm in the next five years? What is the approximate probability of this occurring (for each application)? [Use table below.]

1b. What events could increase or decrease these probabilities? [For applications that may be replaced, use table below.]

1c. Is your firm considering the use of software packages or consulting services for applications that may be replaced? [Use table below.]

IF PACKAGES OR SERVICES ARE BEING CONSIDERED, GO TO 2.

Application	% Prob	Rationale for Increase/Decrease	Pkg/Svc (Y/N)
MRP	______	________________	______
Order Processing	______	________________	______
Warehouse Mgt	______	________________	______
Factory Mgt	______	________________	______
Procurement	______	________________	______
Engineering	______	________________	______
Financials	______	________________	______
Human Resources	______	________________	______

2a. What is driving the replacement?

2b. In evaluating software packages for the applications above, please rate the importance of the following selection criteria below, using a scale of 1 to 5, with 5 being highest importance. Please comment on your rating; for example, if the criteria apply to one application more than another.

Criteria	Rating	Comments
Extensive Built-in Features		
Full Installation Support		
Vendor-provided Product Modifications		
Software Modifiable by Customer		
Client/Server Technology		
Easy to integrate		
Hardware independent		
Conforms to standards		
Vendor reputation		
Other		

3. In performing modifications, there are six elements involved:

	Rank
Access to source code	________
The programming language used	________
Structure and quality of code	________
Adherence to standards	________
The documentation available	________
Access to knowledgeable technical staff	________

Please rank the importance of these elements (from one to six, with one being the most important) and explain your reasoning. In the case of languages, which language (or languages) is preferred?

Explanation

____

____

____

4. I would like to look at the issues involved with software modification in more depth. For your company, by 1995 how acceptable is each of the following enabling technologies, assuming that it was built into an application (1= low acceptability, 5= high acceptability)? Please give the reason for your rating.

Technology	Rating	Reasons
Object-oriented design	______	______________________________
Object-Oriented database	______	______________________________
Built with CASE tools provided with package	______	______________________________
Distributed data base technology	______	______________________________
Relational DBMS	______	______________________________
Written in C+ +	______	______________________________
Written in Smalltalk	______	______________________________
Written in another language (________)	______	______________________________
Other (_________)	______	______________________________

5. If the designers of a packaged software application asked your advice on the critical issues involving the next generation of software, what advice would you give?

____

____

____

THANK YOU FOR YOUR PARTICIPATION.

Report

PACKAGED SOFTWARE PLANS IN SELECTED PROCESS MANUFACTURING SECTORS

January 8, 1993

Prepared for:

Andersen Consulting

Prepared by:

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

INPUT

PACKAGED SOFTWARE PLANS IN SELECTED PROCESS MANUFACTURING SECTORS

I. EXECUTIVE SUMMARY

A. Background

This report summarizes several studies which have examined the market for packaged applications software in the process manufacturing sector.

Much of the material and conclusions are based on primary interview research which INPUT conducted between July and November 1992. During that period INPUT interviewed 114 companies in the food, drug and chemical industries. The analysis contains information from 278 mission-critical applications in those companies.

This summary covers the following topics:

- Overall market size and segmentation
- Buyers values, covering applications, technology and the role of the end user.
- Competitive environment

B. Market Size and Segmentation

This market is not a uniform market. The market varies appreciably in terms of

- The average expenditure per application (from $250,000 in medium-sized chemical companies to $3 million per application in large drug companies)
- The average number of high priority applications per company (from around three per company in most medium-sized companies to five in the larger food and drug companies).
- The number of potential customers (i.e, about 15 large drug companies and about 1,000 medium-sized food processing establishments)

Over the next three years, INPUT estimates that approximately $1 billion will be spent on packaged software in these three target industries (Exhibit I-1).

- These figures are limited, to the extent possible, manufacturing applications within these companies. (Note: These figures exclude hardware expenditures.)
- As Exhibit I-1 shows, about half this figure is in the smaller food processors: This is largely a function of the number of such establishments. The other segments are roughly the same size from a potential revenue standpoint.
- This money may not all be spent; much depends on whether applications meet constantly evolving user needs.

C. Buyer Values

1. Application Focus

Applications with a high degree of "manufacturing" content are those with the highest planned replacement rates. Across the segments measured, there was a fairly constant planned replacement rate of 30% to 40%. The principal applications are the following:

- Plant operations
- Environmental, health and safety
- Customer service
- Resource planning
- Product management

Financial and accounting products are often associated with one or more of the above in the replacement process; however, it is generally the manufacturing applications which drive replacement.

A substantial majority of companies are planning to use software packages as their replacement vehicle.

- Almost 80% of companies interviewed saw a 75% or greater probability of using a software package as their new application.
- Two-thirds of the companies that were less certain of their use of packages would be more likely to use a package if the package was flexible and tailorable.
- The replacement rate compares to a current market share of around 50% for software products (the rest is made up of custom application built in-house or by a vendor).

2. Technology and Other Selection Factors

Technology features (such as client/server) are important to a majority of companies. However, functional issues are even more important, such as ease of integration, standards and built-n features (see Exhibit I-2).

Based on this, and other, research INPUT expects "pure" technology to be less of an attraction as application control shifts even further into end user hands.

Even among technologists, the application benefits of technologies like client/server or object-oriented design are not yet clear

- This uncertainty is partly a question of customers not being fully current on leading edge technology issues.
- Even where customers are informed, there is doubt over whether the actuality of technology will live up to the promises. Many enthusiasts have been sobered by the performance of CASE, for example.

Technology-based solutions will have to demonstrate their effectiveness.

3. The End User Role

One of the most important long term issues is the increased importance of the end user departments in the application selection process.

- Exhibit I-3 shows that in even smaller food processors that the end users have primary decision making in half the companies.
- This percent increases to 70%-80% in the larger companies.
- This trend is expected to continue by all involved.

The involvement of end users has several implications:

- Obviously, the sales process no longer stops at the IS department. (Sometimes it may not even include IS.)
- The process itself will often be different. Functional units are less interested in formal short lists and, even where objective selection criteria exist, they may not be followed.
- More subtilely, end users will be looking for different things from software products (and their vendors). INPUT research in other areas has shown, for example, that application product vendors are valued for their perceived ability to produce a solution, rather than individual characteristics of the package.

D. Competitive Environment

SAP is commonly viewed as the leading vendor in this area (Exhibit I-4). This is undoubtedly true, from the standpoint of SAP's market share among large companies. However, midrange vendors such as J.D.Edwards are quite strong in smaller companies and divisions of large companies.

However, no vendor has a lock on the future market:

- SAP has to prove itself outside of the MVS market.
- All vendors have to prove themselves in a true client/server setting.
- The AS/400 has proved to be a very desirable platform for several firms (Such as J.D. Edwards). However, the AS/400 may prove to be less desirable as an entry into distributed or cooperative applications. At the very least, the turmoil that IBM is going through may produce problems for AS/400 applications developers for reasons outside their control.

Exhibit I-1

Estimated Expenditures per Segment on Packaged Software for Priority Manufacturing Applications: 1993-1995

Industry	Medium Companies ($100-$999 MM)	Large Companies (Over $1 Billion)	Total ($MM)
Drug	110	60	170
Food	500	130	630
Chemical	100	110	210
Total	710	300	1,010

Exhibit I-2

IMPORTANCE OF SOFTWARE PACKAGE EVALUATION CRITERIA

Criteria	Importance (% Respondents Rating 4 or 5*)
Easy to integrate	88%
Conforms to standards	77%
Extensive Built-in Features	76%
Vendor reputation	74%
Full Installation Support	69%
Client/Server Technology	68%
Software Modifiable by Customer	62%
Hardware Independent	56%
Vendor-provided Product Modifications	52%

*1 = lowest importance, 5 = highest importance

Exhibit I-3

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

	Company Size*	
Industry	Medium	Large
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit I-4

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

II. BACKGROUND AND METHODOLOGY

A. Background

This report is a summary of research conducted for Andersen Consulting in July-December 1992.

- In July 1992 INPUT conducted research to understand software purchase rate profiles among potential customers. Two sectors were selected: utilities and food processors.
- This information, along with other information on "Best Bet" software product opportunities and market entry build-up analyses, was reviewed at a worksession in Chicago on August 13, 1992. This material was later summarized in a written report in September 1992.
- This report has extracted material from the August and September analyses on food processor purchasing plans.

As a follow-on to the July/August research, INPUT conducted additional, expanded research in the chemical and drug industries in October and November 1992.

- This additional research went into more detail on specific applications plans.
- The results from this research were reported to Andersen in a draft written report dated November 16, 1992.

This report below combines the material from the November report as well as appropriate material on the food processing sector from the earlier work.

The food processing data is comparable at the industry segment level

At the application level INPUT makes observations in this report on the extent to which the food processing industry's profile is similar to those of the drug and chemical sectors.)

B. Methodology

The material reported on here was obtained from telephone interviews conducted with 114 companies. The distribution of interviews is shown in Exhibit I-1.

- Respondents were those knowledgeable concerning the applications plans and directions of their company.
  - Usually, the respondents were connected with the central IS department, even though the responsibility for applications planning and/or implementation was often located elsewhere.
  - INPUT has found -- in this and other studies -- that the central IS organization is still a good place to obtain corporate-wide information, even if IS is not fully informed on all details.
- Companies were further divided into "medium" and "large" entities ("medium being revenues between $100 and $999 million). Where divisions of large entities operate independently, they were classified as "medium" for the purposes of this analysis.

Within each company INPUT focused on mission-critical applications: for the drug and chemical industries, these were primarily targeted from a specific list agreed to by INPUT and Andersen prior to the survey; for the food processing sector, the respondents selected applications without prompting. The data contains information on 278 mission-critical applications.

In general, INPUT found the respondents were open and forthcoming concerning their companies' plans. In some cases, as noted above, the respondent was not fully informed concerning decentralized applications plans; however, the decentralized units in this sort of situation are often no more able to precisely define their future plans.

Exhibit II-1

Interview Distribution

	Company Size		
Industry	Medium	Large	Total
Chemical	22	24	46
Drug	21	16	37
Food Processing	13	18	31
Total	56	58	114

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

III. FUTURE APPLICATIONS

This section reports on:

- The planned rate of applications replacement
- The extent of software package usage (versus custom development, whether performed in-house or by a vendor)

A. Replacement Plans

Respondents have seen an increased rate of applications change in the last five years (Exhibit II-1). Large drug companies have seen the largest amount of change.

An analysis of priority applications shows that over one-third are expected to be replaced in the next five years (Exhibit II-2). An additional tenth are currently in the process of being replaced.

This picture is virtually unchanged when the secondary applications (financial and other) are excluded (Exhibit II-3). This replacement rate is very similar across all manufacturing-oriented applications.

B. Package Usage

Currently, packages are used in about 40% of priority applications (Exhibit II-4). Drug companies are more likely to use packages now.

A striking finding is that where a replacement is currently planned, over three-quarters of drug and chemical companies see a high probability of using a package (Exhibit II-5). [Study data is not exactly comparable for food processors. However, their software product replacement rates should be similar, given overall trends (Exhibit II-6).]

Another important finding is that where companies are less likely to use a package, the probability of use increases markedly if the package were "more flexible and tailorable than the current generation of software packages." (Exhibit II-7). Potentially, almost all new applications could use packages as a base.

Exhibit III-1

Percent of Companies with Increased Rate of Application Change/Replacement in Last Five Years

	Company Size*	
Industry	Medium	Large
Chemical	76	71
Drug	57	88
Food Processing	54	72

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit III-2

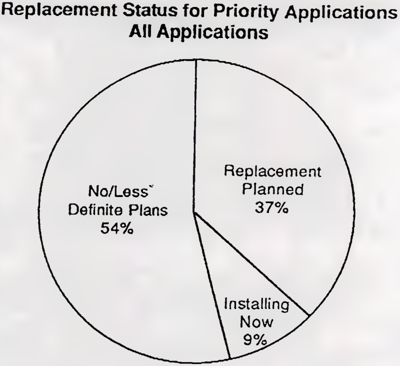
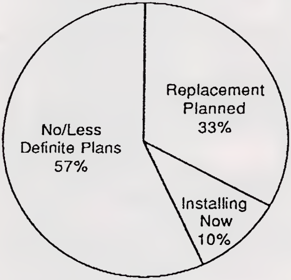


Exhibit III-3

Replacement Status for Priority Applications
Targeted Manufacturing Applications



N = 124

Note: Omits financial and "other" applications

Exhibit III-4

CURRENT PACKAGE USE IN TARGETTED APPLICATIONS

All Firms	40%
Chemical Companies	32%
Drug Companies	52%
Food Processing Companies	38%

Exhibit III-5

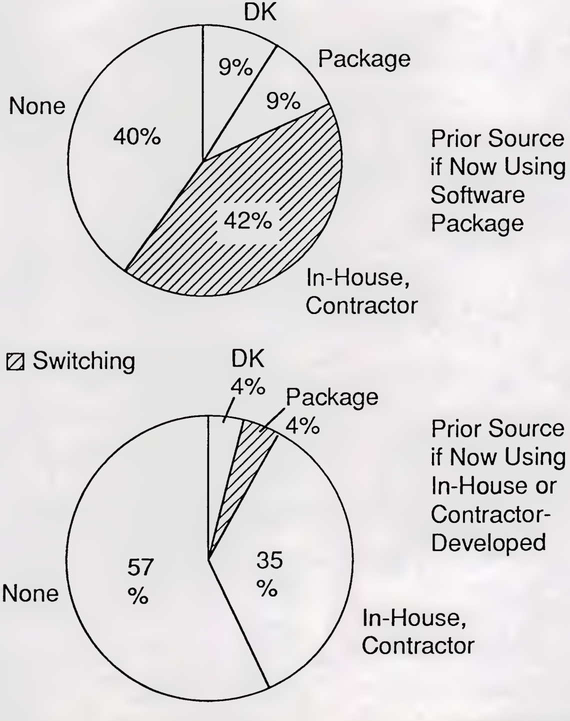
Probability of Using Software Package for Planned Replacement Manufacturing Applications in the Drug and Chemical Sectors *

Probability of Using Package	% of Applications
75% or greater	78%
25-50%	10%
0 or don't know	12%
	100%

*Excluding Financial and "Other"

Exhibit III-6

Switching From Custom To Packaged Software Is Common In The Food Processing Industry



INPUT

Exhibit III-7

Impact of Flexibility/Tailoring on Increasing Probability of Using Packaged Software

Probability of using package for planned replacement	Number of Cases	Number more likely to use package
75%	5	3 (60%)
25%-50%	4	3 (75%)
0/Don't know	5	3 (60%)
Total	14	9 (64%)

Source: Drug & Chemical Companies

IV. APPLICATION SELECTION MOTIVATORS

In the research performed for this study INPUT found that there were two distinct motivators changing application selection practices:

- Increasing end user involvement in applications in general, especially in the selection process
- Changes in technology

A. End User Involvement

As shown in Exhibit III-1, end users already have primary decision making authority over applications generally in most companies. This tends to be higher in the larger companies; this is not surprising, because the operating units are larger and can be more self-sufficient. The end user role, as perceived by the IS department is still increasing on the whole (Exhibit III-2). This perception is especially important since many IS units' interests would be better served if the opposite were the case.

These figures are even more impressive when specific applications are examined (Exhibit III-3).

- The split between large and medium sized firms is striking.
- This indicates that users are taking control of the most important applications first, leaving the less important and/or "maintenance" work to IS.

B. Impact of Technology Changes

About half of the companies say that technology changes are accelerating general applications replacement. This factor is somewhat more important in the larger companies (Exhibit III-4). Based on other work which INPUT has conducted, these are generally feelings influenced by downsizing in general.

However, when questioned on the importance of incorporating new technologies into specific applications, the response was lukewarm at best (Exhibit III-5). Even client/server and cooperative processing received a relatively low response. (The apparently higher ratings for environmental and resource planning is probably a result of small sample sizes.)

INPUT believes that these ratings are low because:

- Many respondents are not very well informed on the quickly-changing technology issues involved.
- Even when respondents are reasonably well informed on technology issues they will have difficulty relating the technology to changes in a specific application.

INPUT expects this problem to become more acute as user departments assume more influence and as vendors begin making more technology claims.

Exhibit IV-1

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software

Industry	Company Size* Medium	Company Size* Large
Chemical	63	71
Drug	75	81
Food Processing	50	82

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

Exhibit IV-2

Role of Users Is Increasing (As Perceived by IS)

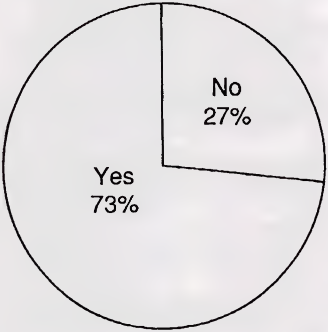
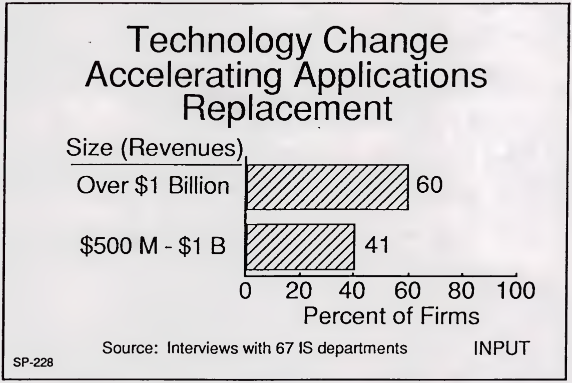


Exhibit IV-3

Percent of Time User Department is Main Decision Maker for Specific Applications in the Chemical and Drug Sectors

	Size of Company	
Application	Medium	Large
Plant Operations	27%	75%
Environment/Health	67%	100%
Customer Service	32%	64%
Resource Planning	40%	100%
Product Management	33%	75%
Industry (as a group)		
Chemical	30%	82%
Drug	50%	71%
All (Not weighted)	40%	78%

Exhibit IV-4



Source: Interviews with 67 IS departments

Exhibit IV-5

Importance of Incorporating Technologies into Manufacturing Applications

Technology	Plant Op	Env	Cust Serv	Res Plan	Prod Mgt	Avg. *
Client Server	3.1	3.8	3.4	3.7	3.1	3.3
Embedded CASE	2.6	2.4	2.6	2.3	2.6	2.6
Objected-Oriented	2.4	2.4	2.6	2.9	2.6	2.6
AI	2.3	2.3	2.3	1.7	2.1	2.2
Cooperative Processing	3.1	3.1	3.1	2.3	3.1	3.0
Number of Interviews	41	14	37	9	15	

* Not weighted; 1 = Not important 5 = Very Important

V. APPLICATION PRIORITIES IN MANUFACTURING

For the chemical and drug sectors INPUT prepared a list of applications for which respondents rated the importance ("Principal Focus" group in Exhibit IV-1). In addition, many respondents volunteered other applications ("Secondary Focus" group in Exhibit IV-1).

Two applications stood out as being of primary importance: customer service and plant operations, being cited by over two-thirds of respondents (Exhibit IV-2, "Priority Group A").

A second group of applications was seen as important by about half of respondents: product management, environmental/health and resource planning (Exhibit IV-3, "Priority Group B")

The third group ("Priority Group C" in Exhibit IV-4) is made up of the more important applications that were volunteered. These include financial systems, distribution/logistics and order entry. INPUT believes that these applications would probably be rated somewhat higher if all respondents had been asked to specifically rate them:

- A few applications may have been overlooked by respondents when they were volunteering priorities.

- Other applications may have been viewed by respondents as being integral to principal applications (e.g., financial or distribution/logistics as part of plant operations).

Sales and marketing applications are important for drug companies and not important to chemical companies (Exhibit IV-5). INPUT believes the profile for food processors would be similar to drug companies, especially in the importance of sales and marketing applications.

Large drug companies cited an average of 4.8 priority applications per company. Other classes of companies averaged about 3.5 applications per company.

As cited in Chapter III, replacements are planned for over one-third of priority applications overall. This percentage does not vary substantially for individual applications.

Exhibit V-1

Application Focus

Principal Focus

Plant operations
Environmental, health and safety
Customer service
Resource planning
Product management

Secondary Focus

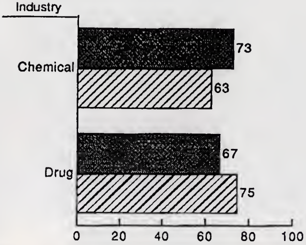
Financial/accounting
Order entry
Distribution
Sales and marketing
Other (e.g., Bar coding, EDI, imaging, maintenance, POS)

Note:

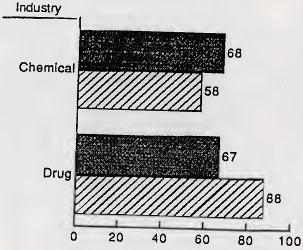
- Respondents specifically questioned on status of "principal" applications.
- "Secondary" application status was volunteered

EXHIBIT V-2

PRIORITY GROUP A: CUSTOMER SERVICES AND PLANT OPERATIONS



PERCENT OF COMPANIES CITING PLANT OPERATIONS AS A PRIORITY APPLICATION



PERCENT OF COMPANIES CITING CUSTOMER SERVICE AS A PRIORITY APPLICATION

Size: ■ $100 Million - $1 Billion

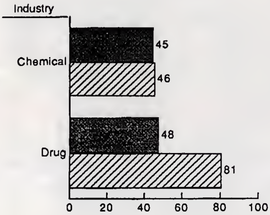
▨ Over $1 Billion

Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

EXHIBIT V-3

PRIORITY GROUP B: PRODUCT MANAGEMENT, ENVIRONMENTAL/HEALTH, AND RESOURCE PLANNING

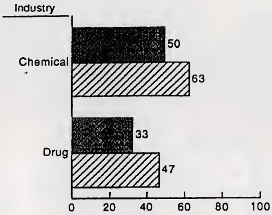


PERCENT OF COMPANIES CITING PRODUCT MANAGEMENT AS A PRIORITY APPLICATION

Size: ▩ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 55%

Source: Surveys of 83 chemical and drug companies/divisions

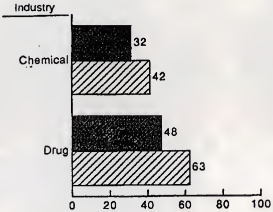


PERCENT OF COMPANIES CITING ENVIRONMENTAL, HEALTH, SAFETY, AND TRAINING AS A PRIORITY APPLICATION

Size: ▩ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 48%

Source: Surveys of 83 chemical and drug companies/divisions



PERCENT OF COMPANIES CITING RESOURCE PLANNING AS A PRIORITY APPLICATION

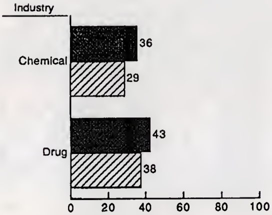
Size: ▩ $100 Million - $1 Billion
▨ Over $1 Billion

Unweighted average: 46%

Source: Surveys of 83 chemical and drug companies/divisions

Exhibit V-4

Priority Group C: Financial Systems, Distribution/Logistics, and Order Entry



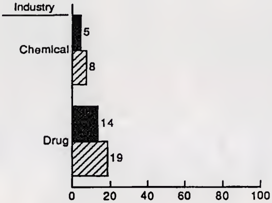
Percent of Companies Volunteering Finncial Systems as a Priority Application

Size: ▩ $100 Million - $1 Billion

▨ Over $1 Billion

Unweighted average: 37%

Source: Surveys of 83 chemical and drug companies/divisions



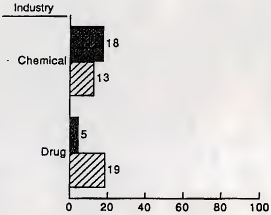
Percent of Companies Volunteering Distribution/ Logistics as a Priority Application

Size: ▩ $100 Million - $1 Billion

▨ Over $1 Billion

Unweighted average: 12%

Source: Surveys of 83 chemical and drug companies/divisions



Percent of Companies Volunteering Order Entry as a Priority Application

Size: ▩ $100 Million - $1 Billion

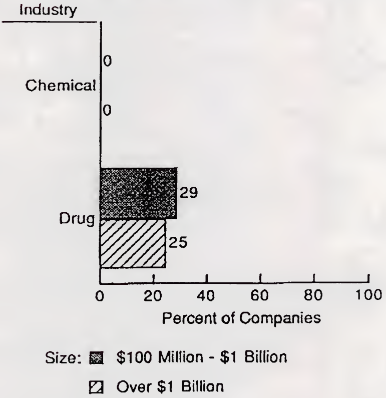
▨ Over $1 Billion

Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

Exhibit V-5

Percent of Companies Citing Sales and Marketing as a Priority Application



Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

VI. SOFTWARE PRODUCT EXPENDITURES

A. Spending by Type of Application

Drug and chemical respondents were asked to estimate the amount that they thought would be invested in software and people costs for particular priority applications over the next five years. Exhibit V-1 shows average spending per application.

- Not surprisingly, large companies are expecting to spend more than medium-sized companies for each application.
- Drug companies plan higher rates of spending per application than chemical companies.

Exhibit V-2 shows spending by application (across chemical and drug companies). Customer service and product management are shown to be the applications with the most spending planned. INPUT expects that food processing companies would have profiles similar to drug companies.

Several cautions should be provided on this data:

- Respondents were generally forthcoming, but often did not know all planned spending (either because they were not totally in the knowledge loop or, more often, because spending plans were part of larger departmental plans that were evolving).
- Figures are order of magnitude and usually ranges.
- While five year figures were requested, INPUT believes that in most cases these figures represent spending over the next 2-3 years.

The net result of these factors is that the figures in Exhibits V-1 and V-2 may be conservative.

B. Market Size Estimates

Exhibit VI-3 takes the average number of priority applications times the average spending per applications to produce an average expenditure per company on priority applications for each segment.

Exhibit VI-4 adjusts the average expenditure per company to average packaged software spending per company and multiplies this by the number of companies in each segment. This produces a market size per segment over the 1992-1995 period.

- As noted above, this figure may be conservative, since not all spending plans could be identified in the research.
- This is balanced by the very real possibility that not all the planned spending may take place: The packaged applications have to be useful ones that meet user needs. In many cases those requiring a new application have not yet come up against the deficiencies of current products in the marketplace.

Exhibit VI-1

Average Spending on Drug and Chemical Applications by Company Size

Application	Size of Company	
	Medium	Large
Plant Operations	$250K	$1 million
Environment & Safety	$250K +	$750K +
Customer Service	$1 million +	$3 million +
Product Management	$500K +	$750K

- Excludes resource planning (insufficient data)
- Based on estimates for 48 applications

Exhibit VI-2

Average Spending per Application By Industry and Company Size

	Size of Company	
Industry	Medium	Large
Chemical	$250K	$750K
Drug	$1 million +	$3 million +

- Includes plant operations, environment and safety, customer service resource planning, product management
- Based on estimates for 53 applications

INPUT

Exhibit VI-3

AVERAGE EXPENDITURES PER SEGMENT ON PRIORITY APPLICATIONS

	MEDIUM COMPANIES			LARGE COMPANIES		
INDUSTRY	AVERAGE # OF PRIORITY APPLICATIONS X	AVERAGE SPENDING PER APPL. ($MM) =	AVERAGE EXPENDITURE PER CO. ($MM)	AVERAGE # OF PRIORITY APPLICATIONS X	AVERAGE SPENDING PER APPL. ($MM) =	AVERAGE EXPENDITURE PER CO. ($MM)
DRUG	4	1.0	4.0	5	3.0	15
FOOD	3	.75	2.25	5	2.0	10
CHEMICAL	3	.25	.75	4	.75	3

EXHIBIT VI-4

EXPENDITURES BY SEGMENT ON PACKAGED SOFTWARE FOR PRIORITY APPLICATIONS: 1993-1995

	MEDIUM COMPANIES			LARGE COMPANIES			
INDUSTRY	AVERAGE SPENDING/CO. ON APPLIC. PKGS ($MM)* x	NUMBER OF COMPANIES** =	APPLICATION PACKAGE EXPENSE ($MM)	AVERAGE SPENDING/CO. ON APPLIC. PKGS. ($MM)* x	NUMBER OF COMPANIES =	APPLICATION PACKAGE EXPENSE ($MM)	TOTAL
DRUG	.75	150	110	3.75	15	60	170
FOOD	.50	1000	500	3.75	35	130	630
CHEMICAL	.20	500	100	3	35	110	210
TOTAL			$710			$300	$1010

* 75% OF TOTAL APPLICATION SPENDING

** ESTABLISHMENTS - INPUT ESTIMATE FROM DEPT. OF COMMERCE DATA

VII. COMPETITIVE ENVIRONMENT

A. Overview

SAP is the current leader in terms of functionality, market share and "mind share". In addition to Andersen, there are four other primary competitors (Exhibit VII-1) as well as several secondary competitors and EDS and Oracle who are potential primary competitors.

However, even SAP does not have a lock on the market: With an MVS product, it is limited to the large scale system, generally inside large companies. Arguably, the delay in r/3 and consequent lost momentum have stopped SAP from becoming the market leader.

- J.D. Edwards is very well placed in the midrange market and from a functionality standpoint comes close to what SAP offers.
- No firm now offers what could be termed true distributed or cooperative processing. Edwards, for example, calls its product "client/server", even though it is on the AS/400 platform.

INPUT believes that this market is in fact quite open to products vendors with these characteristics:

- Provided by a vendor large enough to weather one bad mistake (Datalogix probably could not for example).
- Offered on a client/server architecture (arguably all but possibly Oracle and Ingres would fail this test)
- Committed to the process market (IBM, D & B, SSA, EDS and Oracle are doubtful by this measure)

The following sections assess the strengths and weaknesses of the major vendors as well as an assessment on their futures. (The vendors are listed alphabetically.)

B. ASK

Strengths

- Historic strong position in discrete manufacturing
- Ingres allows tailoring of functions for process applications
- Runs on multiple midrange platforms
- Have made modifications from discrete MRP for process budgeting, forecasting and tracking
- Ingres could serve as long term means of adding client/server functions to applications

Weaknesses

- Ingres commitment probably more of a distraction than a net contributor: An alliance could have produced most or all of benefits (example: NCR and DBMS companies)
- Older technology overall
- Company does not have a great deal of process knowledge and no easy means of getting it (unlike Oracle, with an in-house consulting arm)
- So far, the process components are viewed as add-ons

Futures

- Ingres' strategic commitment is to manufacturing market: It must expand into process
- Similarly, its Ingres investment has to migrate to new technologies.
- This combination means that ASK will remain as a strong, but secondary, competitor

C. Datalogix

Strengths

- A process manufacturing software specialist
- Long-established on various traditional midrange platforms (CIMPRO)
- Recently began offering GEMMS on various UNIX platforms -- objective is a product that runs on multiple hardware platforms in multiple plants. Still in beta.
- Good front end for chemical, energy; adds value in formula management

Weaknesses

- GEMMS still an unknown.
- UNIX platform may prove limiting, especially considering position of AS/400 (which has not been seriously affected so far by UNIX platforms)
- As a fairly small company ($20MM), it cannot afford a product failure.

Futures

- Must remain a competitor (or go out of business)
- Unlikely that UNIX offering can threaten SAP

D. D & B Software

Strengths

- Installed customer base

Weaknesses

- Mainframe orientation; very slow and unsuccessful efforts to break out
- Process offerings offer a limited set of functions based on discrete products
- Overlapping product lines generally from past acquisitions only now being sorted out. Produces confusion among customers and among developers.
- General financial applications and, next, discrete applications take precedence
- Client/server "strategy" depends on third party enabling products and a complex transition strategy: Many things can go wrong

Futures

- Unlikely to be a serious competitor for the foreseeable future

E. J.D. Edwards

Strengths

- Similar functionality to SAP
- Offers full set of financial and discrete functionality
- Large enough company to support full application range
- Even though products run on an AS/400 platform, marketed as a "client/server" product

Weaknesses

- AS/400 platform is both a strength and a weakness: Could lose popularity for reasons outside of Edwards' control.

Futures

- An excellent combination of a specialist that has reached critical mass from a size and market standpoint.
- Is well-positioned to take on r/3.

F. EDS

Strengths

- Very aggressively building its manufacturing presence:
    - McDonnell-Douglas acquisition
    - Investments/alliances with ASK, Consilium, Sherpa
- Resources, people

Weaknesses

- Little activity so far in process software
- In general, EDS has not been successful in software products; services are far more likely to gain support internally
- Alliances are a two-edged sword

Futures

- Will probably not become a major software product competitor

G. IBM

Strengths

- Renewed emphasis on industry orientation at local levels
- Closer linkage between software products, services and other offerings in Trading Area organization
- Increased range of manufacturing software offerings (CIM/400 as general manufacturing product; POMS; PRISM - co-marketed with Marcam)

Weaknesses

- Many opportunities for product and marketing conflicts
    - No longer strong central industry management
    - Trading Areas may not have critical mass to support industry niches
- Product focus is fuzzy, especially between IBM products and partner products

Futures

- Very unclear

H. Marcam

Strengths

- Process software specialist
- PRISM is an established AS/400 product; recently expanded to MS-DOS
- Also agent/consultant for MAPICS
- Good critical mass ($60MM)

Weaknesses

- As with J.D. Edwards, being tied to AS/400 is a strength and a weakness.

Futures

- Will remain a viable competitor, but is unlikely to overtake J.D. Edwards

I. Oracle

Strengths

- Enormous installed base; customers reasonably well-disposed toward Oracle
- Applications in general have become a priority, as part of a reasonable strategy.
- Oracle's evolving architecture is heading in the right direction.
- Excellent sales organization generally; learning about applications.
- New UNIX/MS-DOS products
- Application feedback from consulting organization

Weaknesses

- Process is not a priority now.
- Probably still behind the knowledge curve

Futures

- Oracle will keep up with technology.
- Will Oracle be able to accelerate its knowledge of process applications?
- Is unlikely to be a major process competitor in the medium term

J. Ross Systems

Strengths

- Promix acquisition
- Strength in food industry

Weaknesses

- Older system, written in odd language (Gembase)
- An add-on product, not integrated with other offerings

Futures

- Unclear if acquisition was opportunistic or strategic.
- A narrow base to assault the process market.
- Unlikely to be a major competitor

K. SAP

Strengths

- Dominant position in large companies (both market share and "mindshare")
- Includes all components: Planning, shop floor, accounting, distribution. (Only J.D. Edwards is currently competitive.)
- Beginning to build niche function libraries (e.g., has over 100 functions aimed at oil industry). ABAP 4GL helps address end users from a functional standpoint (developed in C++).
- r/3 can be configured to look like client/server (as an X-window terminal) -- presentation, DBMS and applications modules.

Weaknesses

- Transition from r/2 to r/3 has been slow.
- Unclear if recent management shakeup will affect growth and ability to support clients.

Futures

- Is the benchmark in process software.
- r/3 is now UNIX and Sun-oriented. Windows/OS/2 is next.
- HP, DEC (Alpha), RS6000 on horizon

L. System Software Associates

Strengths

- Discrete core of capabilities

Weaknesses

- Limited process functionality
- AS/400 is strength and weaknesses

Futures

- Unlikely to be a major player

Exhibit VII-1

Packaged Software Competitors in Process Manufacturing

(Alphabetic within Groups)

Leading Competitor

- SAP

Primary Competitors

- Datalogix
- J.D. Edwards
- IBM
- Marcam

Secondary Competitors

- ASK
- D & B
- Ross
- System Software Associates

"Potential Primary"

- EDS
- Oracle

DRAFT REPORT

PACKAGED SOFTWARE PLANS
IN THE CHEMICAL AND DRUG INDUSTRIES

NOVEMBER 16, 1992

Prepared for:

Andersen Consulting

Prepared by:

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

METHODOLOGY

- Telephone interviews with 83 IS executives in the chemical and drug industries in October 1992

	Company Size		
Industry	Medium	Large	Total
Chemical	22	24	46
Drug	21	16	37
Total	43	40	83

* Medium = Revenues between $100 and $999 million
Large = Revenues of $1 billion and over

2

APPLICATION FOCUS

Principal Focus

Plant operations
Environmental, health and safety
Customer service
Resource planning
Product management

Secondary Focus

Financial/accounting
Order entry
Distribution
Sales and marketing
Other (e.g., Bar coding, EDI, imaging, maintenance, POS)

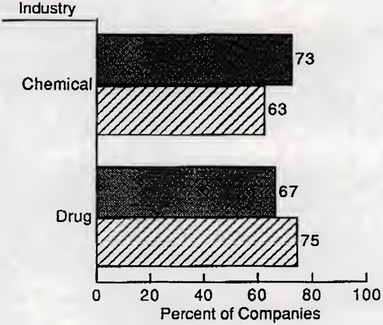
Note:

- Respondents specifically questioned on status of "principal" applications.
- "Secondary" application status was volunteered

PRIORITY APPLICATIONS

- Respondents were asked which applications would be receiving the "most priority in the 1990s".
- Plant operations and customer service receiving priority from most companies (pages 4-5)
- Product management, environmental and resource planning are receiving less priority (pages 6-8)
- Large drug companies cited an average of 4.8 priority applications per company. Other companies averaged about 3 1/2 applications per company.
- Financial applications were volunteered by about one-third of respondents as priority applications (page 9).
- Distribution and order entry were volunteered much less (pages 10-11 4)
- Sales and marketing applications appears to be an important priority for drug companies, while not important at all for chemical companies (page 12)

Percent of Companies Citing Plant Operations as a Priority Application



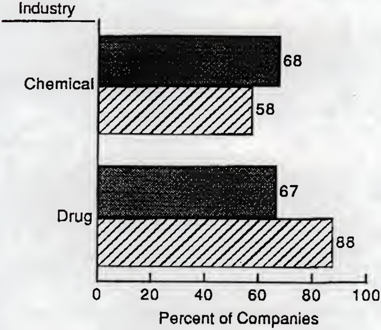
Size: ▩ $100 Million - $1 Billion

▨ Over $1 Billion

Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

Percent of Companies Citing Customer Service as a Priority Application



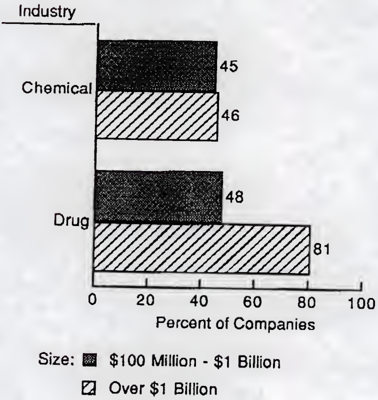
Size: ▩ $100 Million - $1 Billion

▨ Over $1 Billion

Unweighted average: 70%

Source: Surveys of 83 chemical and drug companies/divisions

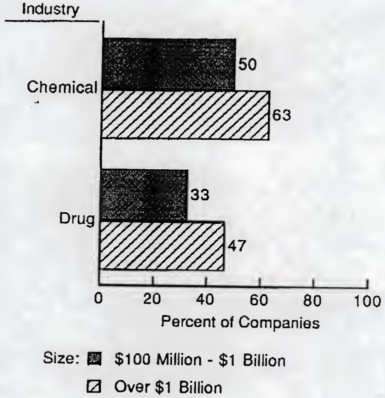
Percent of Companies Citing Product Management as a Priority Application



Unweighted average: 55%

Source: Surveys of 83 chemical and drug companies/divisions

Percent of Companies Citing Environmental, Health, Safety, and Training as a Priority Application

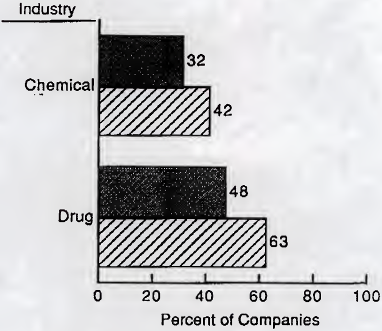


Unweighted average: 48%

Source: Surveys of 83 chemical and drug companies/divisions

8

Percent of Companies Citing Resource Planning as a Priority Application



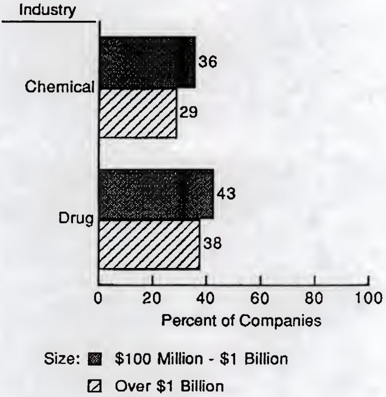
Size: ▩ $100 Million - $1 Billion

▨ Over $1 Billion

Unweighted average: 46%

Source: Surveys of 83 chemical and drug companies/divisions

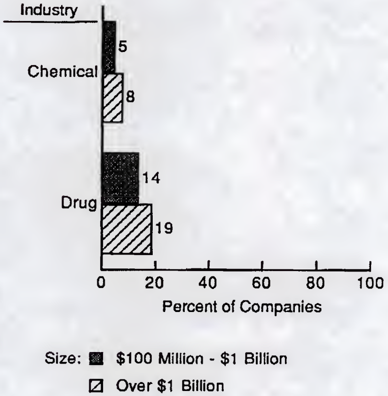
Percent of Companies Citing Financial Systems as a Priority Application



Unweighted average: 37%

Source: Surveys of 83 chemical and drug companies/divisions

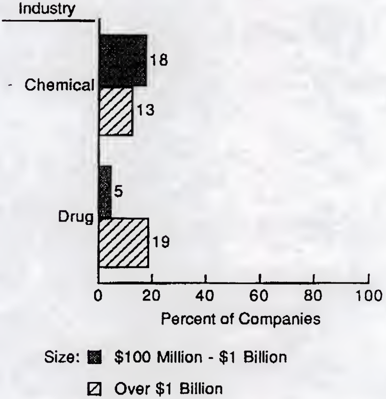
Percent of Companies Citing Distribution as a Priority Application



Unweighted average: 12%

Source: Surveys of 83 chemical and drug companies/divisions

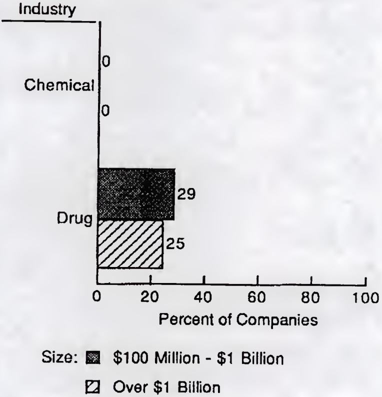
Percent of Companies Citing Order Entry as a Priority Application



Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

Percent of Companies Citing Sales and Marketing as a Priority Application



Unweighted average: 14%

Source: Surveys of 83 chemical and drug companies/divisions

REPLACEMENT PLANS

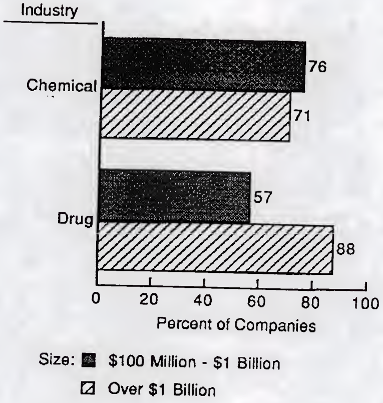
As shown in earlier studies, respondents have seen an increased rate of applications change in the last five years (page 14). Large drug companies have seen the largest amount of change.

An analysis of all priority applications shows that over one-third should be replaced in the next five years (page 15). An additional tenth are currently being replaced.

This picture is virtually unchanged when the secondary applications (financial and other) are excluded (page 16). This replacement rate is very similar across all primary applications (page 17-21). (The lower replacement rate for resource planning may be a function of the small sample size for this application.)

The only other significant variation is that large firms are less likely to be installing an application right now (pages 22-23). However, their replacement plans are virtually identical to medium-sized firms.

Percent of Companies with Increased Rate of Application Change/Replacement in Last Five Years



Unweighted average: 73%

Source: Surveys of 83 chemical and drug companies/divisions

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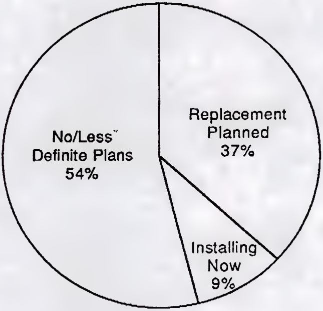
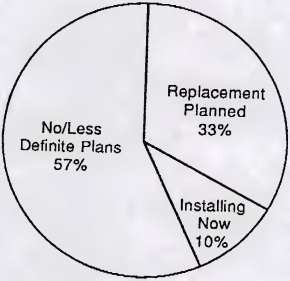
Replacement Status for Priority Applications
All Applications



N = 191

INPUT

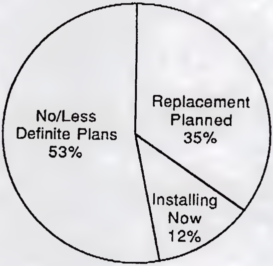
Replacement Status for Priority Applications
Targeted Manufacturing Applications



N = 124

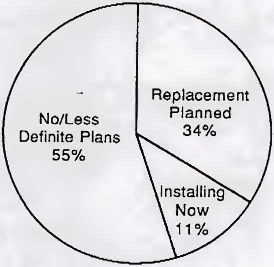
Note: Omits financial and "other" applications

Replacement Status for Priority Applications Plant Operations



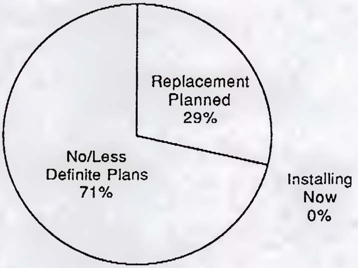
N = 43

Replacement Status for Priority Applications Customer Service



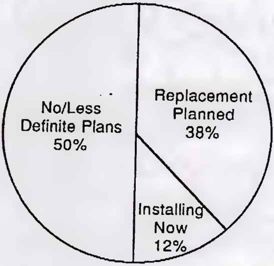
N = 38

Replacement Status for Priority Applications
Product Management



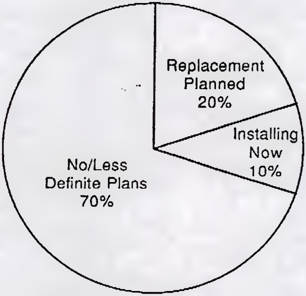
N = 17

Replacement Status for Priority Applications
Environmental



N = 16

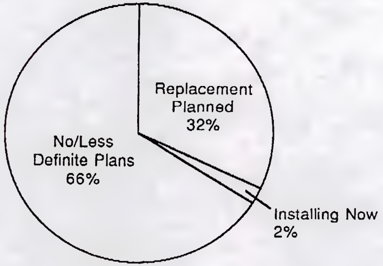
Replacement Status for Priority Applications Resource Planning



N = 10

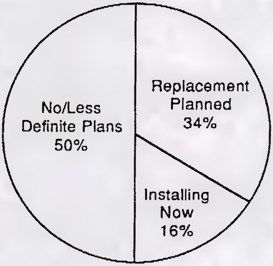
Note: Small sample

Replacement Status for Priority Applications Large Drug and Chemical Companies (Targeted Manufacturing Applications)



N = 56

Replacement Status for Priority Applications Medium-Sized Drug and Chemical Companies (Targeted Manufacturing Applications)



N = 68

PACKAGE VS CUSTOM USAGE

Currently, packages are used in about 40% of priority applications (page 25). Drug companies are more likely to use packages now.

A striking finding is that where a replacement is currently planned, over three-quarters of respondents see a high probability of using a package (page 26).

Another important finding is that most of the remaining companies, where using a package is a lower probability, the likelihood of using a package would be increased if the package were "more flexible and tailorable than the current generation of software packages." (Page 27). Potentially, almost all new applications could use packages as a base.

CURRENT PACKAGE USE IN TARGETTED APPLICATIONS

All Firms		**40%**
• **Medium**	**40%**	
• **Large**	**42%**	
Chemical Companies		**32%**
Drug Companies		**52%**

PROBABILITY OF USING SOFTWARE PACKAGE FOR PLANNED REPLACEMENT MANUFACTURING APPLICATIONS*

Probability of Using Package	% of Applications
75% or greater	78%
25-50%	10%
0 or don't know	12%
	100%

*Excluding Financial and "Other"

IMPACT OF FLEXIBILITY/TAILORING ON INCREASING PROBABILITY OF USING PACKAGED SOFTWARE

Probability of using package for planned replacement	Number of Cases	Number more likely to use package
75%	5	3 (60%)
25%-50%	4	3 (75%)
0/Don't know	5	3 (60%)
Total	14	9 (64%)

IMPACT OF TECHNOLOGY CHANGES

The finding of the positive impact of flexibility/tailoring may appear somewhat in conflict with another finding, the relatively low importance given to incorporating new technologies into applications (page 29).

- Even client/server technology received a somewhat lukewarm response. (The apparently higher ratings for environmental and resource planning is probably a result of small sample sizes.)
- Overall, interest appeared low, somewhat surprisingly, given that IS staff was the source of the information.

One interpretation is that results are valued more than a particular technological route to a result.

- Another factor, obtained from other INPUT research, is that even IS staff (especially IS management) is not very well informed on the quickly-changing technology issues involved.
- IS staff has even less knowledge on what the application impact is likely to be when using a particular technology.

IMPORTANCE OF INCORPORATING TECHNOLOGIES INTO MANUFACTURING APPLICATIONS

Technology	Plant Op	Env	Cust Serv	Res Plan	Prod Mgt	Avg.*
Client Server	3.1	3.8	3.4	3.7	3.1	3.3
Embedded CASE	2.6	2.4	2.6	2.3	2.6	2.6
Objected-Oriented	2.4	2.4	2.6	2.9	2.6	2.6
AI	2.3	2.3	2.3	1.7	2.1	2.2
Cooperative Processing	3.1	3.1	3.1	2.3	3.1	3.0
Number of Interviews	41	14	37	9	15	

* Unweighted; 1 = Not important 5 = Very Important

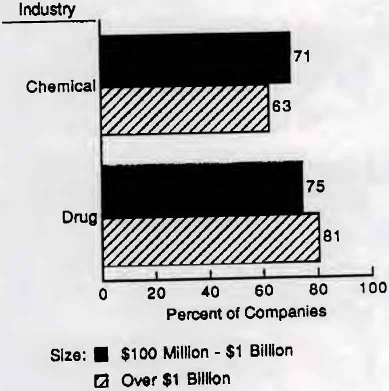
END USER INVOLVEMENT

In any event, the direct impact on application decision making by IS staff is often indirect and is probably declining. Page 31 shows general trends, across all applications.

Much more interesting are the respondents assessment of which organizational unit is likely to make a decision in a particular application (page 32).

- The split between large and medium-sized firms is striking.
- This split confirms the findings of earlier research that showed that large firms were more likely to have decentralized operations generally, putting more power into operating units.

Percent of Companies Where End Users Have Primary Decision-Making Authority for Replacing/Changing Application Software



Source: Surveys of 83 chemical and drug companies/divisions.
"Primary" = 50% or more.

PERCENT OF TIME USER DEPARTMENT IS MAIN DECISION MAKER FOR SPECIFIC APPLICATIONS

	Size of Company	
Application	Medium	Large
Plant Operations	27%	75%
Environment/Health	67%	100%
Customer Service	32%	64%
Resource Planning	40%	100%
Product Management	33%	75%
Industry (as a group)		
Chemical	30%	82%
Drug	50%	71%
All (Unweighted)	40%	78%

SPENDING ON MANUFACTURING APPLICATIONS

Respondents are asked to estimate the amount that they thought would be invested in software and people costs for particular priority applications over the next five years. Page 34 shows average spending per application.

- Not surprisingly, large companies are expecting to spend more than medium-sized companies for each application.
- Drug companies plan higher rates of spending per application than chemical companies.

Page 35 shows spending by application (across chemical and drug companies). Customer service and product management are shown to be the applications with the most spending planned.

Several cautions should be provided on this data:

- Respondents were generally forthcoming, but often did not know all planned spending (either because they were not totally in the knowledge loop or, more often, because spending plans were part of larger departmental plans that were evolving).
- Figures are order of magnitude and usually ranges
- While five year figures were requested, INPUT believes that in most cases these figures represent spending over the next 2-3 years.

The net result of these factors is that the figures on page may be conservative.

AVERAGE SPENDING ON MANUFACTURING APPLICATIONS BY COMPANY SIZE

	Size of Company	
Application	Medium	Large
Plant Operations	\$250K	\$1 million
Environment & Safety	\$250K+	\$750K+
Customer Service	\$1 million+	\$3 million+
Product Management	\$500K+	\$750K

- Median spending (see sheet on methodology)
- Excludes resource planning (insufficient data)
- Based on estimates for 48 applications

AVERAGE SPENDING PER APPLICATION BY INDUSTRY AND COMPANY SIZE

	Size of Company	
Industry	Medium	Large
Chemical	$250K	$750K
Drug	$1 million +	$3 million +

- Median spending (see sheet on Methodology)
- Includes plant operations, environment and safety, customer service resource planning, product management
- Based on estimates for 53 applications